NEW ZEALAND
JOURNAL OF
Agriculture
DECEMBER - 1959

TOY SET
Little Princess
BAKING SET

HEALTH MYCOLOGICAL
FEB 1960

THE BEST OF ITS TYPE ON THE MARKET!

C.M.R.

SHORT SPRAY RACE

THE BEST SHORT SPRAY RACE ON THE MARKET!

With your spray race use Dieldrin-based specially formulated CMR Spray Race Fluid . . . a stable emulsion that does not break down under pump agitation, aeration or high pressure.

COOPER, McDOUGALL & ROBERTSON (N.Z.) LTD., Auckland and Christchurch

Volume 99
Number 6
15 December
1959

NEW ZEALAND
JOURNAL OF
Agriculture
(Established 1910)

Published by
Direction of
Hon. C. F. Skinner,
Minister of Agriculture

CONTENTS

Dairy Farming in Kaikoura .. .. G. Mason .. 506
Ram and Ewe Fairs 510
Facial Eczema Poison Isolated 511
1959 Porker and Baconer Competitions .. .. E. D. Edwards .. 513
Pedigree Pig Improvement Scheme 518
Recent Research Work 519
Care of Livestock during January 520
Crop and Pasture Production (Seasonal Notes) 521
Meteorological Records for October 522
Clover Case-bearers .. .. L. J. Dumbleton .. 523
Consumption of Dairy Products in New Zealand .. J. V. White .. 525
Control of Onion White Rot by Seed Pelleting .. J. D. Allen, H. C. Smith, and L. C. Hurndell .. 531
Efficient Feeding out of Chou Moellier .. .. J. L. Symons .. 534
Effects of Hogget Mating on Lifetime Performance of Ewes .. .. K. H. C. Lewis .. 537
The Home Garden .. .. A. G. Kennelly .. 543
Domestic Beekeeping .. .. D. A. Briscoe .. 551
Effects of Border Dike Irrigation and Fertiliser Placement on Lucerne .. .. J. Lammerink .. 553
Ill Thrift and White Muscle Disease 559
A. and P. Show Dates and Wool Sales 560
Crop Production: Linseed and Linen Flax .. .. E. Delahunty and M. L. Cameron .. 561
Mossy Growths on Roofs and Lawns 569
Survey of Subtropical Fruit Orchards .. .. W. A. Fletcher .. 570
Leatherjacket Damage to Cocksfoot Stands .. .. A. R. Rankin .. 571
Redroot in Chou Moellier Controlled with MCA .. H. McM. Bull .. 573
Livestock Numbers by Land Districts .. .. J. V. White .. 575
Dairy Produce Graded for Export 576
Didymella Stem Rot of Tomatoes .. .. .. H. C. Smith and L. C. Hurndell .. 577
Radio Broadcasts for Farmers 584
Zinc Deficiency of Newcastle Apricots .. .. W. S. Kemp .. 585
Kitchen Colour Schemes .. .. Eleanor Couston .. 590
The Flower Garden:
  Poisonous Plants .. .. K. H. Marcussen .. 594
  Work for January .. .. Rosalie A. Campion .. 601
Child's Tie-round Feeder .. .. Judith Ferrier .. 605

[*D. R. Brenchley*

The "cocky" who has to be about his farm chores early most mornings, winter and summer, is not the only first-light riser on 25 December. With our Christmas cover of two young people who were up with the dawn go the best wishes of the "Journal" to all its readers.

NEW ZEALAND DEPARTMENT OF AGRICULTURE

HEAD OFFICE:
Dominion Farmers' Institute Building,
Featherston Street, Wellington

DIRECTOR-GENERAL:
P. W. Smallfield

ASSISTANT DIRECTOR-GENERAL:
I. J. Cunningham

Director (Administration): G. J. Anderson

DIVISIONAL DIRECTORS:
Animal Industry .. J. E. McIlwaine
Animal Research .. .. J. F. Filmer
Dairy .. .. H. A. Foy
Farm Advisory .. J. W. Woodcock
Horticulture .. .. A. M. W. Greig

Editor: G. J. Neale

SUBSCRIPTION RATES

The "Journal" is issued monthly. The subscription within New Zealand is 10s. a year; the overseas subscription is 13s. (sterling). Subscriptions can be paid directly to any office of the Department of Agriculture, or the "Journal" may be ordered from any bookseller or newsagent. Individual copies are available from Publications Section, Department of Agriculture, P.O. Box 2298, Wellington, at 1s. a copy, post free.

Subscribers' inquiries (preferably accompanied by the address cut from a recent "Journal" wrapper) should be sent to the nearest office of the Department of Agriculture.

COPYRIGHT PROVISIONS

Articles in "The Journal of Agriculture" are copyright, but may be reprinted **provided both the "Journal" and author are acknowledged and the articles are not associated with advertising material.**

The Minister of Agriculture does not accept responsibility for any of the private and trade advertisements included in this publication.

All correspondence relating to the "Journal" should be addressed to the Editor, "The New Zealand Journal of Agriculture", P.O. Box 2298, Wellington.

REGISTERED AT THE G.P.O., WELLINGTON, AS A MAGAZINE

[*National Publicity*

The Kaikoura Flat with Mt. Fyffe Range and the Seaward Kaikouras in the background.

Dairy Farming in Kaikoura

KAIKOURA, some 120 miles north-east of Christchurch on the main highway and railway to Picton, is well known to travellers. The backdrop formed by the 4,000 and 5,000 ft peaks of the Mt. Fyffe Range, some 4 miles north-west of the township, is an impressive feature, and in addition the visitor frequently takes away pleasant memories of the first-class sea fishing to be had along the coast. However, he probably knows very little about the main industry which helps support the township, that of dairying, from which the local dairy factory produces over 600 tons of butter per annum. To gather some facts about the production from dairy farms on the Kaikoura Flat, officers of the economics section of the Department of Agriculture at Christchurch made a farm survey of the district early in 1958, and this article by G. Mason, Farm Advisory Officer (Economics), sets out the salient features of the survey.

DAIRY farms of the district are mainly on the Kaikoura Flat, a highly fertile area to the west and north of the township which was once known as "The Swamp", as it then grew little but raupo, niggerheads, flax, rushes, and tutu. The development of this swamp dates from about 1860, when the superintendent of the newly constituted Marlborough Province authorised a survey to be made of the area and a township to be laid out. Many settlers of Irish origin were attracted to the new sections, and the story of settlement of the area is one of hard work by these people.

Essential to the development of the swampy area was the construction of an all-weather road through it. The new access, called the Mt. Fyffe Road, was formed in the early 1870s by prospective settlers, who provided their services in part payment for the land they were to buy. With improved access and prospects of further amenities, the sale of land speeded up so that most of the sections were taken up by the late 1870s.

Not until the development of the factory system of butter production did dairying become important. At first farmers depended on uncertain incomes from the shipment of potatoes to the gold workings of the West Coast, and later from growing wheat. Employment on road construction and on bush felling supplemented many farming incomes. Today the economy of the plain is firmly based on dairy production with some sheep fattening and a limited amount of cash cropping. The Kaikoura Co-operative Dairy Company was formed in 1894, and at present it has about 220 suppliers.

Topography and Soils

Dairying in the area is carried out mainly on soils of recent origin which have been formed by river deposits and accretion from the shingle fans of the flanks of the Mt. Fyffe Range. The area divides roughly into the sloping fan formation, where soils are sometimes very stony and gravelly, and the flatter area, where good silt loams have developed. The latter merges into the sandy and stony flats formed by relatively recent flooding of the Kowhai River. The soil types are:

1. Hapuku loams.
2. Waimangarara silt loams and mottled silt loams (impeded drainage).
3. Wairau and Upper Wairau gravelly sand.

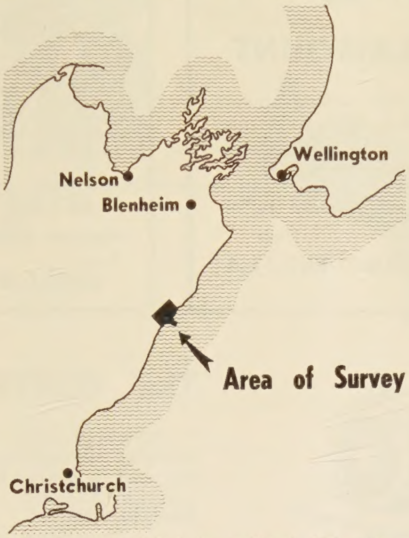
The stony and sandy loam soils of the sloping fans (Hapuku types) are generally less fertile than the river flats and require more liberal topdressing with superphosphate and lime.

The slow-draining silt loams (Waimangarara types) of the flats carry excellent dairying pastures. Where flooding has been less recent and the soils are consequently older, the organic matter content is higher, but the calcium and available phosphate lower.

The free-draining soils near the Kowhai River (Wairau types) are high in phosphate and calcium, but productivity is limited during periods of drought where the soils are stony. On the silt and sandy loams production is more constant.

The Survey

The main object of the survey was to collect management data to serve as background material for farm advisory work in the area. At the same time some financial material was collected to give an indication of the net returns being obtained by farmers.



It was decided to collect data from only full-time dairy units, and for the purposes of the survey a full-time unit was taken as one which produced over 5,000 lb of butterfat for the 1956-57 season. There were actually 81 farms producing more than this quantity of butterfat and the sample comprised 48 of these farms.

The 81 suppliers contributed 91 per cent of the butterfat to the factory and the 48 sample farms about 55 per cent. The average butterfat production for the 1956-57 season for the classified full-time farms was 13,500 lb, and the 48 sample farms had a similar average annual production. The sample farms were thus considered to be fairly representative of the full-time dairy units.

Size of Farms

The majority of the farms were really family units, 45 of the 48 farms being operated by the owner with varying amounts of family assistance but with no outside permanent labour. The size of farms was measured in "effective area", this being the area of the farm less areas of bush, scrub, waste, etc., which could not be used by stock for any part of the year. Twenty-four or 50 per cent of the farms had effective areas between 50 and 100 acres and seven or 14.6 per cent were below 50 acres. The balance of 17 farms had areas of 100 acres or over. The average effective area of the farms was 111 acres.

Stock on Farms

The average number of cows milked on the survey farms for the 1956-57 season was 48 and most of the herds contained between 25 and 50 cows. Thirty-four of the herds or 71 per cent were of the Jersey breed.

TABLE 1—HERD SIZE IN 1956-57 SEASON FOR 48 FARMS PRODUCING OVER 5,000 LB BUTTERFAT

Dairy cows	No. of herds
Under 25	1
25 and under 50	30
50 and under 75	11
75 and under 100	5
100 and over	1
	48

The average herd size (48 cows) was small compared with that of the major dairying districts of the North Island. In the 1956-57 season the average herd size in the South Auckland district and in Taranaki was 69 cows. The North Island figure quoted was based on herds of 10 or more cows. If all herds of 10 or more cows in the Kaikoura district had been included, the average herd size would actually have been less than 48 cows.

The average effective area per cow milked was 2.3 acres, but this figure does not show the real position, since some sheep and a few beef cattle were run on some of the farms. Also seasonal fattening of store lambs was a common practice. Another complicating factor was that some farmers wintered their cows on run-offs.

Production

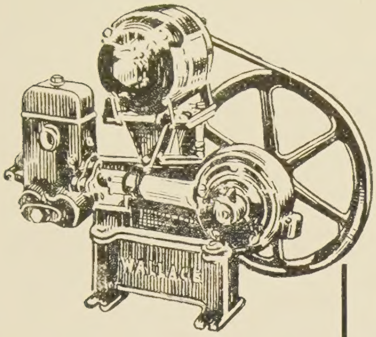
The average butterfat production per farm for the 1956-57 season was 13,500 lb, but there was a considerable deviation from this figure.

TABLE 2—BUTTERFAT PRODUCTION IN 1956-57 SEASON FOR THE 48 SURVEY FARMS

Butterfat production lb	Per cent of survey farms
5,000 and under 10,000	25
10,000 and under 15,000	46
15,000 and under 20,000	17
20,000 and over	12
	100

Though 46 per cent of the farms produced between 10,000 and 15,000 lb of butterfat, 25 per cent produced less than 10,000 lb. As 10,000 lb of butterfat per annum is usually considered to be the minimum production for a sound unit, there is the impression that Kaikoura has a considerable number of farms which in other districts would be considered doubtful

THE RIGHT PUMP



FOR EVERY PURPOSE . . .

For farm, household supply, bach or irrigation, Wallace automatic pressure systems are ideal for bach and household supply. All models can be supplied with 15, 47, 60 or 90 gallon pressure tank.

THE PARAMOUNT

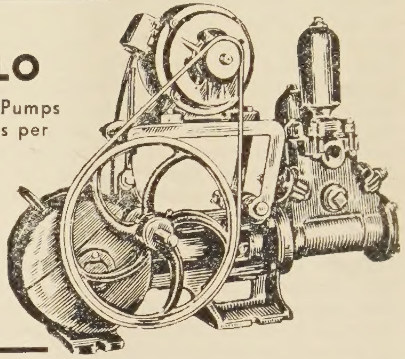
A double-acting pump delivering 250 gallons per hour, with a vertical suction lift of 25 feet.

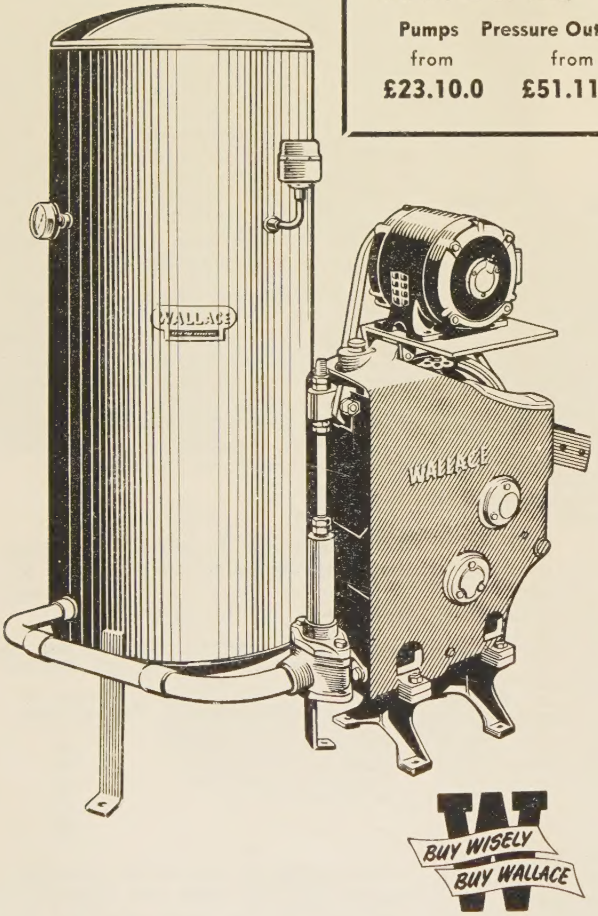
Pumps	**Pressure Outfits**
from	from
£23.10.0	**£51.11.4**

THE POWERFLO

In three models. Pumps up to 750 gallons per hour, or with a maximum head of 575 feet.

Pumps from
£57.0.0
Pressure Outfits
from
£100.0.0





The GREENFIELD

A deep-well bore pump. Constant pressure automatic oiling to all working parts. Double spur gears and eccentric cast in one unit. Rigid main shaft bridges crankcase.

Gearing from	**Pressure Outfits** from
£66.0.0	**£104.0.0**

PLAN YOUR
IRRIGATION NOW

Wallaces carry a complete range of irrigation equipment, suitable for market gardens, crops, orchards and dairy farms. Economical package plants available for small holdings, strawberry growers, etc.

BUY WISELY
BUY WALLACE

D. McL. WALLACE
LIMITED
Head Office, Newmarket, Auckland.
P.O. Box 9010. Phone 52-079.
Branches and Agents throughout N.Z.

POST THIS COUPON

D. McL. WALLACE LTD.
P.O. Box 9010, Newmarket, Auckland.
Please send full details, without obligation on
Wallace Pump ☐ Irrigation Systems ☐
Name ....
Address ....
....
Please mark X if required for school project ☐

economic units. However, other factors must be taken into account when assessing whether or not a unit is economic, as will be seen from the brief discussion on the financial returns being obtained by Kaikoura farmers.

The average production of 124 lb of butterfat per effective acre is low when compared with some of the main dairying areas of the North Island. The lowest average per-acre production for any of the Taranaki farm-improvement groups (groups of farmers cooperating with the Department of Agriculture) is 166 lb, 42 lb greater than for Kaikoura. The highest average per acre production for the Taranaki groups was 209 lb per acre. Differences in climate naturally account for part of the discrepancy in production.

TABLE 3—BUTTERFAT PRODUCTION PER EFFECTIVE AREA FOR 1956-57 SEASON FOR THE 48 SURVEY FARMS

Butterfat production per acre lb	No. of farms
50 and under 100	12
100 and under 150	14
150 and under 200	10
200 and under 250	9
250 and under 300	3
	48

Though over half the farms produced less than 150 lb of butterfat per acre, average butterfat production per cow was 284 lb, which was 20 lb per cow higher than the Dominion average for 1956-57. Nearly 80 per cent of the herds produced above an average of 250 lb per cow.

TABLE 4—AVERAGE BUTTERFAT PRODUCTION PER COW FOR THE 48 HERDS FOR 1956-57 SEASON

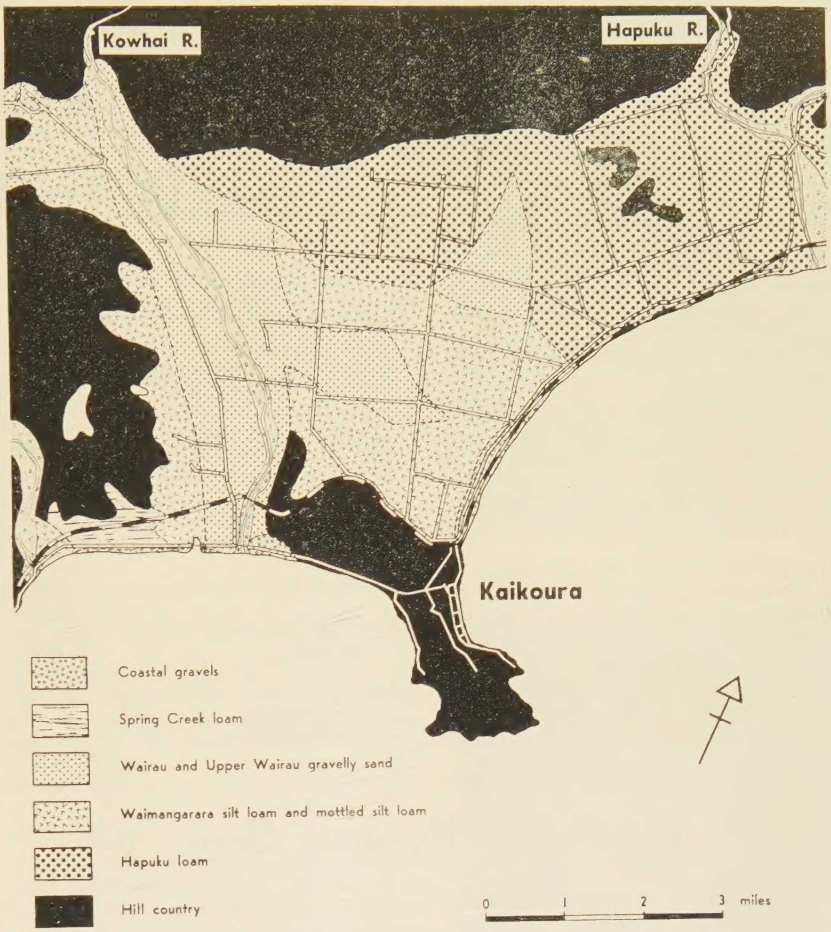
Average butterfat per cow lb	No. of herds
Under 150	1
150 and under 200	1
200 and under 250	8
250 and under 300	22
300 and under 350	13
350 and over	3
	48

Pig Production

Pig raising provided a valuable contribution to farm incomes in the district. On only two farms in the survey were pigs not kept as a subsidiary enterprise. A recorded average of 9 milking cows per sow and a gross financial return of 6½d. per pound of butterfat for pig meat indicate the significance of pig raising.

Supplementary Feed; Pasture Renewal

The growing of supplementary fodder crops is confined practically to the lighter soils bordering the flanks of the Mt. Fyffe Range and the more recently developed farms along the inland road to Waiau. Only seven of the 48 farms grew winter fodder crops in the 1956-57 season and the same number grew summer fodder crops. The average acreages of these crops grown per farm were 3.8 acres and 4.1 acres respectively.



Soils of the survey area.

Winter feed requirements are met mainly with hay and the use of run-offs for herds at the end of the season.

Renewal of pasture was at a fairly low level, only 19 of the 48 properties sowing an average of 6.4 acres to new pasture during the 1956-57 season.

Finances

The level of returns earned by the dairy farmers in the survey during 1956-57 was looked at firstly from the point of view of net incomes earned and secondly from the viewpoint of net returns as a percentage of the total farm capital.

A comparison has been made (Table 5) between the figures for the survey farms and those of a sample of dairy farms representative of the Dominion as a whole. This sample is taken from the Department of Statistics "Survey of Dairy Farm Incomes for 1956-57". The figures relate to 663 suppliers of cream to butter factories. Every endeavour has been made to make the two sets of figures comparable.

TABLE 5—AVERAGE NET INCOME FOR 48 KAIKOURA DAIRY FARMS FOR 1956-57 COMPARED WITH THE AVERAGE FOR 663 DAIRY FARMS REPRESENTATIVE OF THE DOMINION

	Kaikoura	Dominion sample
Number of farms	48	663
Average cows per farm ..	48	62
Average butterfat per farm (lb)	13,500	15,550
*Average gross income ..	£2,844	£3,063
Average gross income per cow	£59.3	£49.4
Average expenditure ..	£1,254	£1,723
Average expenditure per cow	£26.1	£27.8
†Average net income ..	£1,590	£1,340
Average net income per cow	£33.2	£21.6

* Gross income: Includes all items of farming income plus the excess of closing over opening values of livestock and less the purchases of livestock.

† Net income: Corresponds to the accountant's net profit figure and is the gross income less all farm expenditure and depreciation.

The net income for the Kaikoura farms compares favourably with the Dominion figures. The Kaikoura farms earned an additional £5 per cow from pigs, £4 for sale of other livestock (mainly from sale of fat lambs and wool, this being a subsidiary source of income on about half of the properties), and £1 from other sources. A number of minor differences contributed to the expenditure of nearly £2 less per cow. Payments for wages, repairs and maintenance, seeds, and manures were smaller, but contractors' charges, rent, and interest were higher.

Net Returns as Percentage of Total Farm Capital

By expressing net returns as a percentage of the total capitalisation of the farm an indication is gained of the earning capacity of this capitilisation. In arriving at the percentage return the following explanation is given:

Net return = net income plus any rent and interest payments minus an allowance for the owner's labour and management.

To arrive at the wages and management allowance £625 per annum was taken as a wage to the owner, and to this was added an arbitrary amount of 10 per cent of the gross income; for the 48 farms this came to an average of £284. Thus the total wage and management allowance was £909.

Total farm capitalisation is the total valuation of land and improvements, livestock, and plant. The latest Government valuations were used for land and improvements and livestock were valued at £20 for milking cows, £15 for other cattle, and £3 for sheep. Plant was assessed at current resale values. The computation of the average return on capitalisation for the 48 farms is as follows:

	£
Average gross income ..	2,844
Average expenditure ..	1,254
Average net income ..	1,590
Add interest and/or rent ..	124
	1,714
Less wages and management allowance ..	909
Average net return ..	805
Average total farm capitalisation	10,400
Average net return as percentage of farm capitalisation ..	7.7 per cent

For 1956-57 this return could be considered quite favourable.

Though the financial data have lost some significance as a result of the reduction in the guaranteed price for butter since the 1956-57 season, the figures nevertheless show a healthy level of farm incomes for Kaikoura in comparison with Dominion figures. A contributing factor to this was the rather low cost structure which had been achieved in the district, coupled with a high return from the sale of livestock, particularly pigs.

Main Features of Survey

The main features of the survey were:

- Most farms are run as family units, the average number of cows milked being 48 on an average effective area of 111 acres. The average production of the full-time units was 13,500 lb of butterfat.

- Pig raising provided a valuable addition to income, gross returns from this source being 6½d. per lb of butterfat for the 1956-57 season.

- Few supplementary fodder crops were grown, winter requirements being met mainly by hay and run-off areas.

- Financial data for 1956-57 show favourable net incomes when compared with those for similar farms in other areas.

References

"History of Kaikoura District" (unpublished thesis), J. McA. Sherrard, Canterbury University College 1948.

"Soils and Agriculture of Awatere, Kaikoura, and Part of Marlborough Counties", Soil Bureau Bulletin 9, H. S. Gibbs and J. P. Beggs.

◆◆

Harvesting Ryegrass Seed

IN the harvesting of ryegrass seed the aim should be to obtain the maximum quantity of seed with the best possible germination. This means that the crop must be windrowed at the right time and the seed must go into the bag in a fit condition.

Most crops are windrowed with either a mower or a binder and this should be done when the seed is beginning to fall. At this stage at least two-thirds of the stem should have lost its green colour. Care must be taken not to windrow too soon, as the crop will come to more harm on the ground than it will standing.

The windrow should be narrower than the pick-up on the header and should be of an even density. Even threshing is good threshing. Threshing can begin when the seed has lost its green colour and the whole windrow is dry. The air blast on the header should be used to remove straw and light seed. There is no reason why the header sample should not be almost up to machine-dressed standards.

—*B. J. McSWEENEY,*
Farm Advisory Officer,
Department of Agriculture,
Timaru

◆◆

Ram and Ewe Fairs

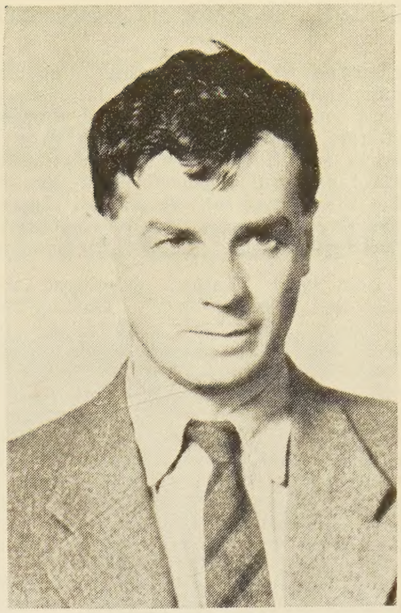
The following are dates and venues of ram and ewe fairs up to the end of March:

14 and 15 December—First Feilding Flock at Feilding.
17 and 18 December—Hawke's Bay at Hastings.
11 and 12 January—Manawatu Stud at Palmerston North.
14 and 15 January—Masterton at Masterton.
18 January—Wairoa County at Wairoa.
26 January—Second Feilding Flock at Feilding.
4 February—Canterbury Stud at Addington.
11 February—Canterbury Flock at Addington.
12 February—Timaru Stud Ram and Ewe (all breeds) at Timaru.
12 February—Dannevirke at Dannevirke.
19 February—Timaru flock at Timaru (fat breeds).
23 February—Otago at Dunedin.
1 March—South Otago at Balclutha.
4 March—Timaru flock at Timaru (wool breeds).

◆◆

Isolation of Poison Causing Facial Eczema Brings Control Nearer

THE poisonous principle responsible for facial eczema disease in sheep has now been isolated after 20 years of intensive research. It is an apparently pure substance which has been named "sporidesmin". In making this announcement the Minister of Agriculture, Mr Skinner, said this latest advance in the long and detailed study of the disease was one of the most notable achievements in agricultural science in this country. Prospects of discovering a satisfactory means of combating the disease had been considerably enhanced.



Dr Synge.

THE scientists primarily responsible for the isolation of "sporidesmin" were Dr R. L. M. Synge, F.R.S., of the Rowett Research Institute, a Nobel prize winner, and Dr E. P. White, of Ruakura Animal Research Station. However, Dr Synge, whose services were made available to Ruakura for a period, has pointed out that Dr White in his earlier work on concentrating the poison from dried grass had then virtually isolated the poisonous principle. Only the difficulties of getting large quantities of toxic grass and the low concentration of the liver-damaging factor in this material had prevented the final goal being reached. Discovery of the fungus *Sporidesmium bakeri* in 1958 and ability to grow it at will and the much greater concentration of the toxic principle overcame this barrier.

Outstanding Recent Progress

"Though much of the facial eczema research work in recent years has been done at Ruakura Animal Research Station, the outstanding recent progress has been based on a very widely supported inquiry involving overseas scientists specially brought out by the Government to help in the work and scientists of the Departments of Agriculture and Scientific and Industrial Research", said the Minister. All were very highly qualified specialists in particular fields, Dr Synge, for example, being a world authority on the branch of chemistry known as chromatography, which played an important part in the chemical studies of facial eczema.

Dr Synge considers that the prospects for a simple and quick procedure for estimating "sporidesmin" in fungal cultures, field specimens, etc., are good. Scientists hoped shortly to decide on the best procedure to use on samples collected during the 1959-60 season. Such a method would give a means of measuring when toxin appears in the field and of studying more closely the conditions which favour this.

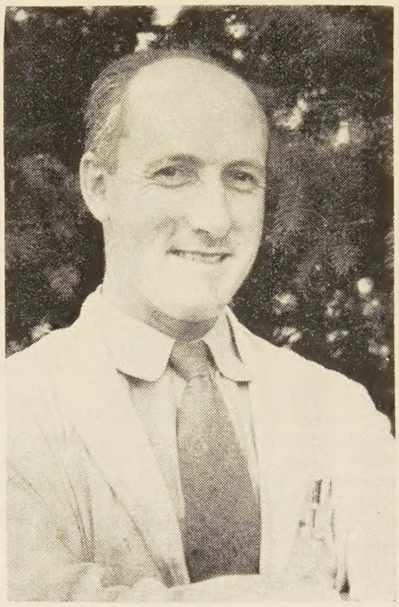
Next Steps

Now that the poisonous principle had been isolated, one of the next steps would be to attempt to prepare a vaccine to protect animals against the toxin. Work in this direction had been going on concurrently with other studies of the disease, and Wallaceville Animal Research Station would continue to give the highest priority to it.

"Pay-off" for 20 Years of Study

Though two dramatic advances in the fight against facial eczema had come in little more than 12 months—the discovery of the fungus *S. bakeri* causing liver damage and the isolation of "sporidesmin"—this tangible progress was really only the "pay-off" for 20 years of unremitting study, said Mr Skinner. Results had proved the correctness of the decision made by New Zealand scientists almost 20 years ago to concentrate on a search for the liver-damaging factor.

The name "facial eczema" given to the disease because of scabs produced on the faces of affected sheep and cattle had probably misled many laymen, even farmers, about the difficulties of ascertaining its true nature. Very early investigations showed that the outward effects of the disease resulted from prior liver damage. This was proved to be due to a poison eaten with the pasture, but this was present only under certain conditions and only in some seasons. One of the major problems had been to get enough—sometimes any—toxic grass. Another was to evolve some means of proving that grass was toxic other than by feeding it to sheep.



Dr White.

Eventually satisfactory means of preserving grass (by drying) were developed and toxic grass identified by reference to the liver damage which occurred in lambs grazing a special experimental area. At a later stage very young guinea pigs were adopted as test animals because they proved fairly sensitive to the liver-damaging substance and required much less of the toxic material, which had always to be used as economically as possible because of the difficulty of securing it.

Still later Ruakura developed the so-called "beaker test". During the extraction of toxic pasture it was observed that a deposit appeared on the walls of the beaker in which the extract was evaporated. The deposit was not itself the liver-damaging factor or in fact poisonous, but its presence was found to indicate with reasonable accuracy that the pasture sample was toxic. This beaker test required only about 2 oz of dried grass and could be completed in a few hours.

The problems already very briefly mentioned were only some of the many which had to be solved before scientists could move with confidence toward the main one of isolating the cause of the facial eczema. The reward for years of painstaking, often frustrating, and sometimes, unfortunately, much-criticised activities came with the discovery in September 1958 that the fungus *S. bakeri* produced liver damage characteristic of facial eczema. The possibility that a fungus or some other micro-organism might cause facial eczema was considered years ago, but no evidence to support this came until joint studies were made by microbiologists from the Soil Bureau of the Department of Scientific and Industrial Research and field workers at Ruakura.

First Fungus Link

In early March 1958 when grass was being collected because conditions were such that facial eczema was expected, E. P. Percival, of Ruakura, noticed some white fungal threads at the base of pasture plants on the area being cut. Several turf samples containing them were forwarded to the microbiologists. About two weeks later much more of this fungal material was collected from another area.

It was proved that facial eczema liver damage could be produced with this fungal material.

The investigators had now reached the stage where they had a material which contained a much greater concentration of the liver-damaging factor than the most toxic samples of pasture so far collected. This helped greatly toward the extraction of the toxin in pure form. This point was particularly important because it was already known that only a few parts of the facial eczema toxin were present in every million parts of dried pasture. That had made progress in chemical studies extremely slow and difficult.

Significance of "Sporidesmin" Isolation

In a sense Dr Synge and Dr White had by their discovery narrowed facial eczema investigations, said Mr Skinner. Actually their solution of this major problem opened the way for research into a range of individual chemical problems involving workers in many specialised fields.

Many aspects of the growth of the fungus *S. bakeri*, its production of the toxin "sporidesmin", and how best to produce extracts for the chemists to work on would have to be studied.

Now, however, plenty of material for the chemists to work on should be available. Formerly research workers had had to depend on the quantity of toxic pasture which they could collect. Now that they could deal with the disease-producing fungus alone, supplies of toxic material could be grown in the laboratory.

Object Lesson

"The story of facial eczema research up to the recent promising stage has some lessons for all of us", said Mr Skinner. "It has shown just how complex are investigations of animal diseases of this nature and how unrealistic it is to expect early solutions; it has proved that right from the start the line of attack on facial eczema was correct.

"Dr Synge, an eminent figure in science, has been most impressed by the excellent spirit of collaboration and free discussion between research workers on facial eczema at the various scientific institutions in New Zealand. I am quite certain that much of the success achieved is due to this highly developed team work.

"Remember," said Mr Skinner, "facial eczema has been, until very recently at least, peculiar to New Zealand. Scientists had therefore to pursue this problem without a vestige of information specific to this disease from outside, they had to devise special techniques and equipment to meet peculiar problems, and they were always under pressure because of the constant threat to livestock farming which the disease constituted.

"Despite the notable achievements so far, an easy method of controlling the disease has not yet been devised. Farmers will have to continue meantime to use the recommended preventive measures. However, with the isolation of the poisonous principle the immunising of stock becomes distinctly possible."

☆

Harvesting Subterranean Clover Seed

SUBTERRANEAN clover seed is difficult to harvest and the operator needs everything in his favour if he is to succeed in putting a good crop in the bags. The first requirement is a dense and deep mat of growth with little or no admixture of grasses or other impurities, for, at present prices, a fairly heavy seed yield is essential.

A COMMON harvesting method is to cut the dead ripe crop with the mower, with or without lifting fingers attached. For success with this method a heavy crop of deep litter is desirable. Cutting will take place in January or February and extra seed will be secured if there is light dew or other moisture on the crop when it is cut. This toughens the tender stalks holding the burrs and prevents many of them breaking away.

Lifting fingers will normally increase the seed yield by raising burrs above ground level as the knife approaches. Threshing may be carried out with a header harvester or a clover huller either from the swath or after a period in stack.

Raking Method

Another very common harvesting method and one that is applicable under most circumstances is that in which a stiff-tined dump rake is used in place of a mower. The crop is merely raked into windrows when dead ripe in January or February. Here again, the seed yield will be increased if the crop is handled when slightly moist. After a period of drying out in the windrows the material may be threshed directly from the paddock or stacked for later threshing. This raking method is not suitable on areas where surface stones would be dislodged by the tines.

Under ideal conditions crops that are in the form of a heavy, even mat of material can be direct headed successfully. Such crops must be dead ripe and dry and the header (fitted with lifting fingers) must travel very slowly.

Subterranean clover seed is difficult to thresh from the burrs and frequently the material is put through the header twice to thresh it more completely.

—*J. P. BEGGS,*
Farm Advisory Officer,
Department of Agriculture,
Blenheim

1959 Carcass Competitions Show

Importance of Rate of Growth in Successful Pig Production

ENTRIES in the North Island Porker and Baconer Carcass Competitions sponsored by Messrs W. and R. Fletcher (N.Z.) Ltd. at Tomoana, Patea, and Westfield freezing works this year totalled 3,276 pigs. The quality of the leading teams was maintained at a high level and a number of farmers have again scored well in the growth-rate section. Economy in production based on rapid growth in pigs should be the aim of all pig producers and in this article E. D. EDWARDS, Research Officer, Department of Agriculture, Wellington, reviews competition results and discusses the importance of feeding and breeding for rapid growth.

THE relatively small number of entries this year coincides with a marked increase in pigs slaughtered in the Dominion, over 100,000 pigs more than in the previous year. It would appear from this that farmers are more concerned with carrying more pigs than in quality aspects, hoping to increase net income in this manner. These efforts may succeed, but are they as profitable as performance recording can make them?

TABLE I—POINTS SYSTEM USED IN COMPETITIONS

	Maximum points Porkers	Maximum points Baconers
Measurement		
Body length	20	20
Backfat: Shoulder	10	10
Loin	15	20
Balance of side	5	5
Eye appraisal		
Hams	15	15
Shoulders	10	10
Development of loin ..	10	10
Belly thickness	5	5
Marketing points	10	5
Total carcass points	100	100
Team points		
Evenness of weight ..	10	10
Conformation	10	10
Total carcass points (four carcasses)	400	400
Carcass quality max. per team	420	420
Growth-rate points per team	100	100
Max. points for growth-rate section	520	520

[Orr

Mr K. W. Sewell of Patutahi, Gisborne, with his team of Large White cross baconers which won the grand championship for baconers with 362 points. Mr Sewell also won the championship for combined baconer and porker teams.

The entries comprised groups of four pigs, each carcass being individually appraised and team points allotted as in Table 1.

Entries in the growth-rate section fell to 46 and the standard was generally lower than in previous years. Mr V. Griffin of Hexton won the porker section with 429 points in a close contest with Messrs Fowell Bros., Howick, 426 points, and Mr H. J. Billington, Eketahuna, 423 points. Messrs Fowell Bros. produced the best carcasses with 340 points, but lost points for rate of growth. The other two entries secured full marks for growth rate but lost points for loin development and shoulders.

The growth-rate section baconer prize went to Mr L. F. Eustace, Hawera, with 420 points, 337 points for carcass and 83 for growth rate. These were whey fed pigs and from a National Hybrid sow bred by the New Zealand Pig Producers' Council at Korakonui.

Entries in each category of the growth-rate section which reached the merit standard by gaining 70 per cent or more of the total points are shown in Table 2.

K-16
FOR
RUSTY
ROOFS
AND
TANKS

AND ANYTHING ELSE THAT'S RUSTY OR LIKELY TO GO RUSTY!

This revolutionary paint "loves" rusty surfaces, such as rusty roofs and rusty iron and steelwork of all kinds, and gives the appearance of new galvanising.

K-16 ANTI-CORROSIVE PAINT IS AVAILABLE FROM PAINT, HARDWARE AND STOCK FIRMS IN PINTS, QUARTS, GALLONS AND 4-GALLON TINS.

SPEEDWAY
STERILISER
BURNS OIL OR WOOD
STEAM & BOILING WATER

Write for FREE Illustrated Catalogue

SPEEDWAY PRODUCTS LTD
GT. SOUTH ROAD, PENROSE
P.O. BOX 24
and at
FORD BUILDINGS, COURTENAY PLACE
WELLINGTON
139 WORCESTER ST CHRISTCHURCH

SUBSCRIPTION RENEWALS

☆

Renewals of subscriptions to "The New Zealand Journal of Agriculture" should be paid to the nearest office of the Department of Agriculture. Subscribers can ensure continuity of delivery by paying their subscriptions as soon as possible after receiving their renewal notices and at least 1 month before the old subscription expires. When payment is made the renewal notice should accompany the subscription to ensure that the correct details are recorded.

Use Basic Slag for immediate action and lasting effect

Belgian Basic Slag creates a permanent pasture. It gives an immediate boost to pasture growth, and also gives you a residual benefit, as many of its constituents permanently enrich the soil.

Basic Slag phosphates won't wash out under heavy rain. Only soil acids act on the phosphates in Belgian Basic Slag. Heavy rainfall will not wash these phosphates out of the soil, so they remain for long periods to promote the growth of grasses and clover.

BELGIAN BASIC SLAG
THE INVALUABLE FERTILISER

Available in 112 lb. double-jute bags.

There's more to tractor value than low price alone

ASK ANY NUFFIELD OWNER

It's well worth knowing about the first-class engineering that goes into Nuffield Universal models. Generous bearing areas, high quality steels and "inside design" features are not immediately apparent but it IS these things that give the Nuffield Three and Four greater efficiency and long-lasting reliability.

NUFFIELD
UNIVERSAL
THREE AND FOUR

ARRANGE A DEMONSTRATION—IT COSTS NOTHING BUT PAYS DIVIDENDS

N.Z. Distributors:—

THE DOMINION MOTORS LTD.
Licensed Motor Vehicle Dealers
Wellington, Auckland, Christchurch, Timaru.
There's a Nuffield Dealer in your Town.

TABLE 2—TEAMS GAINING 70 PER CENT OR MORE OF TOTAL POINTS IN GROWTH-RATE SECTION

The details below are given in the following order: Exhibitor; breeding of pigs; date of birth; age (in days) at slaughter; average deadweight (in pounds) of four pigs; carcass points; total points; total points as percentage of possible points (520).

PORKERS

V. Griffin, Hexton; L.W. x; 29/1/59; 104; 73¾; 329; 429; 83
Fowell Bros., Howick; L.W.; 15/12/58 to 26/1/59; 93 to 135; 74¼; 340; 426; 82
H. J. Billington, Eketahuna; L.W.; 21/1/59; 113; 77¼; 323; 423; 81
M. McCullough, Makauri; L.W. x B.; 25/1/59; 108; 72; 314; 414; 80
J. G. Johnston, Pukekohe; L.W. x B.; 1/11/58; 116; 77¼; 302; 399; 77
A. N. Furze, Mangorei; L.W.; 16/12/58; 98; 73¾; 298; 398; 77
N. W. Frost, Ngakuru; L.W.; 23/11/58; 121; 76; 304; 394; 76
L. F. Eustace, Hawera; L.W. x N. Hybrid; 12/11/58; 127; 78¼; 305; 389; 75
Ian Billington, Eketahuna; L.W.; 25/1/59; 109; 76½; 289; 389; 75
M. Cooper, Eketahuna; Tam x; 20/12/58; 124; 78¾; 291; 384; 74
J. Gilmour, Te Aroha; L.W. x; 10/12/58; 139; 82½; 312; 381; 73
D. M. Gray, Morrinsville; T. x B.; 4/12/58; 110; 73¾; 276; 376; 72
H. J. Billington, Eketahuna; L.W.; 21/1/59; 113; 77¾; 272; 372; 72
Mrs M. E. Bent, Otorohanga; L.W. x (L.W. x L.B.); 30/12/58; 120; 69¼; 290; 368; 71
A. N. Furze, Mangorei; L.W.; 12/11/58; 132; 88; 269; 364; 70

BACONERS

L. F. Eustace, Hawera; L.W. x N. Hybrid; 13/10/58; 193; 139¾; 337; 420; 81
H. Wenzlick, Maungakaramea; L.W. x B.; 5/6/58; 180; 133¾; 316; 408; 79
H. J. Billington, Eketahuna; L.W.; 9/8/58; 173; 140¾; 297; 397; 76
H. Wenzlick, Maungakaramea; L.W. x B.; 24/6/58; 181; 138¾; 300; 395; 76
L. F. Eustace, Hawera; L.W. x N. Hybrid; 13/10/58; 211; 139½; 334; 390, 75
M. Cooper, Eketahuna; Tam x; 10/7/58; 196; 146¼; 301; 387; 74
Fowell Bros., Howick; L.W.; 8/11/58; 200; 128½; 330; 383; 74
G. E. Ingram, Patea; L.W. x L.B.; 18/10/58; 172; 130¼; 281; 378; 73
P. A. Ingram, Patea; L.W. x B.; 27/9/58; 193; 129; 312; 377; 73
H. J. Billington, Eketahuna; L.W.; 9/8/58; 187; 141¾; 282; 376; 72
H. A. and A. D. Aiken, Waverley; L.W. x B.; 2/8/58; 187; 138¼; 285; 375; 72
N. J. Aiken, Waverley; L.W. x B.; 21-29/9/58; 189-193; 143; 276; 369; 71
L. Aiken, Waverley; L.W. x B.; 16-23/7/58; 196-203; 133¾; 298; 365; 70

Full Value for Top Quality Pigs

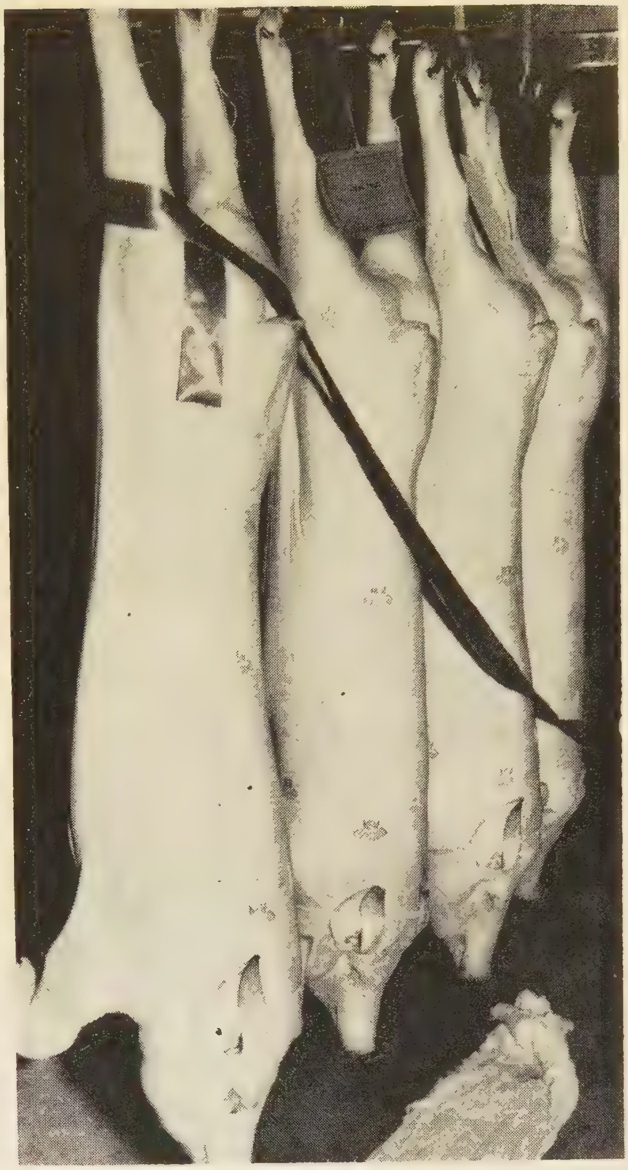
PRODUCERS of quality baconers may now earn the premiums for baconers under the Premium Grade Schedule which traders have agreed to offer as one of the purchasing options during the current season. Prime 1 grade baconers qualify for a premium of 2d. per pound over Prime 2 grade baconers, which in turn are 2½d. per pound over Second Quality. A flat "No Grade" schedule of ¾d. per pound below the Prime 2 grade price makes it well worth while for producers of better than average pigs to sell on the Premium Grade Schedule.

A baconer of 140 lb dead weight would return 32s. more if graded Prime 1 or 8s. 9d. more if graded Prime 2 than if sold under "No Grade".

Producers' representatives have for years sought the introduction of worth-while incentives to the production of quality pigs. A quality carcass, which is the result of careful breeding and feeding, is the foundation of the production of a cured product which can be marketed readily and economically.

The main danger at this time of year is overfeeding, which results in carcasses that are much too fat for today's market. Overfeeding is usually due to more feed being available than is needed for the pigs kept. The alternative to overfeeding is to conserve some milk as curd for winter feeding. The local officer of the Department of Agriculture or Pig Council will advise producers on the equipment needed and the correct procedure.

Aspects of breeding and management that lead to the production of profitable high quality pigs are dealt with in Bulletin No. 366 "Production of Quality Pig Carcasses" (free from your local Departmental office).



[Orr

Mr Sewell's porker team which won the grand championship with 344 points.

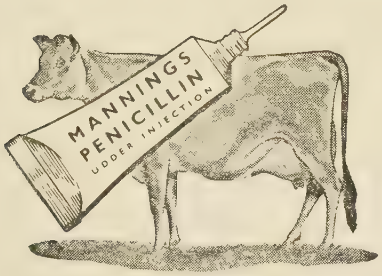
Quality Baconers

Some excellent baconers are produced at Gisborne. In 1957 Hooper Bros. won with a record 369 points for carcass, last year Mr K. W. Sewell bettered this with 871 points, and this year his winning team scored 362 points. In addition his porker team with 344 points was the best entry and enabled him to take the combined teams prize.

These results prove that there are some very good strains of pigs in the country, which with first-class management yield a product of the highest quality. Such a product deserves a reward for the skill and resources required to produce it. There is a promising trend in negotiations to introduce a new grading scheme providing a premium for quality pigmeat, and results show that many farmers will be able to earn such a premium.

MANNINGS

PENICILLIN UDDER INJECTION



FOR MAMMITIS

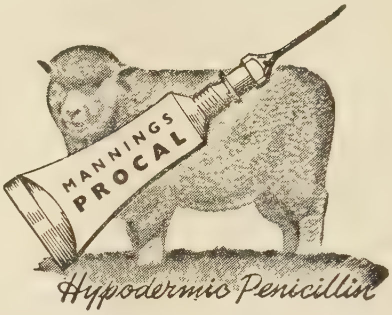
in three strengths

'25' '50' '100'

with the thin, smooth nozzle.

Available in either round or flat tins.

PROCAL PENICILLIN

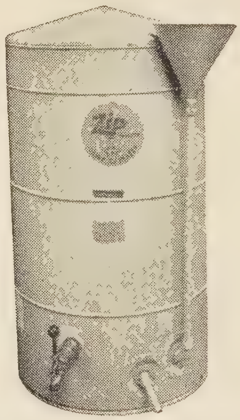


FOR SHEEP after assisted lambing, and *all farm animals*

Bloodpoisoning and Blackleg in Sheep, Footrot in Cows and pigs, Arthritis in Lambs and Pigs.

2 strengths—'100' '500'. In flat tins with hypodermic needles.

Zip "PEDIGREE" DAIRY HEATERS



An extra "hand" in your dairy

Having a ready supply of hot water in the dairy where it's needed most is like employing extra help. Put a Zip "Pedigree" Dairy Heater on your pay-roll . . . efficient, reliable, will pay its own way with sheer hard work. Check these features of the Zip "Pedigree" Dairy Heater.

- ★ *25% less heat loss than accepted standards.*
- ★ *Cases manufactured from enamelled, galvanised iron.*
- ★ *Fully corrugated copper cylinders.*
- ★ *Fully lagged with high quality flock.*
- ★ *Quick action, fast-flow taps.*

WARRANTED by manufacturer's written guarantee for five years.

GUARANTEED to comply with specifications of the Electric Supply Authority Engineers' Institute of N.Z. Limited (Inc.).

Available in 7 sizes from 18 gallons to 45 gallons capacity.

Obtainable from Stock and Station Agents, Dairy Companies and authorised Zip distributors.

Quality costs no more . . . insist on a Zip!

ZIP INDUSTRIES LTD., AUCKLAND, WANGANUI, LOWER HUTT, NELSON, CHRISTCHURCH, INVERCARGILL

However, many more farmers could do so by paying particular attention to their feeding methods. If these methods are not sound, it is difficult to get a first-grade carcass even from a well bred pig. Maximum use must be made of existing pig accommodation and any planned by ensuring that as many pigs as possible are put through each unit each year. Well bred, well fed pigs soon justify good housing without necessarily increasing labour cost.

[Orr

Mr R. J. Mountfort, Woodville, with his team of Large White cross baconers which won the Young Farmers' Clubs' grand championship with 340 points.

Importance of Heavy Weaners

The basis of economic growth and high quality carcasses is well grown weaners. Pedigree breeders and producers who aim at heavy weaners through selection and feeding are setting the foundation for profitable production, as the weight at weaning is closely related to later rate of growth and efficiency of feed conversion and the development of a meaty carcass.

Pig recording clubs 30 years ago focused attention on this important aspect of pig management. They established the fact that the weight of a pig at 16 weeks was about 2½ times its weight at eight weeks. Thus at 16 weeks a 40 lb weaner would be 25 lb heavier than a pig weaned at 30 lb and could be marketed three weeks or a month sooner, permitting better use of housing and labour. Its growth pattern should result in a good quality carcass and efficient use of food even to the baconer stage.

The importance of a good start cannot be stressed too often. The formation of lean meat, without which pigs cannot grade well, is laid in the early stages.

A recent report of the British Landrace Progeny Testing Company's second boar progeny test showed that not only did heavy weaners reach bacon weight earlier than light weaners, but they also graded better over the hooks. The report showed that the faster the pigs grew the more efficient was their use of food. This is an important aspect under New Zealand pig farming conditions.

In this test pigs were fully fed right up to slaughter and it demonstrates the value of selecting for rapid growth. Top quality baconer carcasses can be produced economically, without restriction of the ration at any stage, from pigs with a high potential growth rate and high quality carcass characteristics.

Tables 3 and 4 show the relevant data obtained with Landrace pigs in the British progeny test.

In this test feed efficiency improved steadily from 4.55 lb of food per pound of gain where the liveweight gain was between 1.0 to 1.19 lb per day to 3.64 lb of food per pound of gain where the rate of daily gain was between 1.8 and 1.89 lb.

TABLE 3—EFFECT OF WEANER WEIGHT ON TIME REQUIRED TO REACH 200 LB LIVEWEIGHT (950 PIGS UNDER TEST)

56-day weight lb	Days to reach 200 lb liveweight
30 and under	186.9
31-35	180.7
36-40	178.7
41-45	171.9
46-50	167.2
51-55	159.6
56 and over	159.7

TABLE 4—THE RELATION BETWEEN WEANING WEIGHT AND CARCASS GRADING

56-day weight lb	No. of of pigs	Days to 200 lb	Per cent grade A
40 and under	147	179.7	61.2
41-45	135	172.9	64.4
46-50	132	168.4	75.0
51 and over	79	162.7	77.2

This British information indicates that the inclusion of a growth-rate section in our carcass competitions is sound, even though it is not possible to obtain accurate food-consumption records. Teams which score well in the growth-rate section are of a high standard and reflect a sound selection policy and care in feeding.

The small number of entries in the growth-rate section suggests that few farmers are aware of the advantages of recording performance in this manner.

The most important need at present is for better care of young pigs. For

SUCCESSFUL PIG PRODUCTION . . .

instance, too few farmers use a creep for suckers. To achieve heavy weaning weights it is necessary to supplement the sow's milk with meal or pellets, which should always be available from the time piglets will accept such a supplement.

If time can be found to weigh litters at weaning, the effort will be well worth while if it stimulates interest in the pigs right through to the stage when they are on hooks. At least it would encourage better treatment of weaners. Pigs at this stage must be properly fed and housed to prevent that check in growth, accompanied by disease and waste of food, which so often occurs.

The lack of care of weaners is a major weakness in our pig management. A recent survey revealed weaners did not receive meal on two-thirds of farms where skim milk was fed and on a third of farms where whey was used. The average weaner in New Zealand would weigh only about 30 lb liveweight. Overfeeding on bulky liquids at this stage can be just as disastrous as underfeeding.

To exploit fully the capacity of weaners for rapid growth it is necessary to use meal supplements. They promote good health and, if the ration is appropriate, permit full development of muscle and bone, the foundation of a good carcass.

Economic Use of Meal

However desirable it may be to own healthy pigs which grow rapidly and yield a good carcass—pigs which have been given every opportunity to show their worth—all producers are concerned about the outlay on meals necessary to achieve this. The point is that the really good pig man can spend £1 on meals per pig sold and get away 15 or 16 fat pigs per sow each year, whereas most farmers spend only about 10s. per pig and manage to sell eight or nine fat pigs per sow over the year. This expenditure takes into account all meals used on the farm.

When 15 or 16 pigs per sow are being got away the sows are really pulling their weight with excellent performance. Normally these sows get some meal at lactation. In the contrasting performance cited sows get little if any meal. Thus the meal bill for fattened stock is similar in both cases. But if we assume that the supply of milk is the same in both cases, how are the extra pigs reared to marketable weights?

This is achieved by making better use of available food: Firstly, wisely selected breeding stock under good management produce good, strong litters. Secondly, these litters get meal supplement when it is used most efficiently—in the creep and for a month or so after weaning; not, as so many pigs do, as stores on inadequate winter rations. Thirdly, housing is of reasonable standard so that food is not wasted in maintaining body warmth.

Farmers who winter store pigs usually take them on to baconer weight and may lose financially in two additional ways: 1. Such pigs may become overfat if not fed carefully in spring. 2. It is more expensive to convert food into fat than into meat, and there is the risk of down grading of the carcass with a stiff penalty.

These difficulties can be avoided to some extent by selling the shorter, early maturing pigs as porkers. Pigs carried on to bacon weight that have a tendency toward overfatness need to have their rations restricted from the time they reach about 130 lb liveweight to not more than six food units daily.

The essential point is to use supplementary meal early, in the creep and to weaners, to get rapid early growth. That is where meal feeding pays best. The better the stock and management are the more meal can be used.

Pedigree Pig Improvement Scheme: Qualified Litters

Contributed by the Animal Industry Division

THE following table sets out particulars of litter performance, growth-rate, and carcass quality points for those litters which have qualified in the Pedigree Pig Improvement Scheme for publication since those appearing in the October issue of the "Journal".

Owner	Breeding of litter: Sire	Breeding of litter: Dam	Date born	Litter weight at 3 weeks	Dead weight lb	Growth rate (25)	Length (20)	Back fat Shoulder (10)	Back fat Loin (15)	Bal. (5)	Ham (15)	Sh. (10)	L. (10)	B. (5)	M. (10)	Total points (125)
Class A Porkers																
B. G. and W. D. Dron	B 32662	B 32601	7/5/59	75	76	14	14	9—	15	5	9	6	7	5	8½	92½
N.Z. Pig Pro. Council	LW 14907	LW 13672	12/1/59	100	67	10	13½	9+	13—	5	10½	8	7	4	9	89
N.Z. Pig Pro. Council	LW 14907	LW 13145	30/12/58	109	103	16½	13½	8½+	*14½+	4	11½	7½	7½	5	8	96½
N.Z. Pig Pro. Council	LW 14950	LW 13597	7/11/58	104	115	17½	15½	5—	13½—	5	10½	6	6½	5	5½	90
N.Z. Pig Pro. Council	LW 13098	LW 13518	13/11/58	95	71	17	15½	8½—	14—	5	11½	8	8½	5	10	103
Class B Porkers																
N.Z. Pig Pro. Council	LW 15513	LW 14529	1/1/59	110	98	12	15	8½+	10½+	3½	12½	7½	6½	4	6	86
E. D. H. Branthwaite	LW 16094	LW 15461	21/3/59	116	103	11	18	6½+	11½—	4	9½	8	6½	3	6	84
Class C Porkers																
N.Z. Pig Pro. Council	LW 14894	LW 14347	4/11/58	91	71	18	15	7½—	14—	5	12	9	9	4	9½	103
N.Z. Pig Pro. Council	LW 14894	LW 13478	27/12/58	91	70	13½	20	9+	13+ —	5	9	8	6½	2	8½	94½
N.Z. Pig Pro. Council	LW 14894	LW 14319	26/10/58	93	94	15½	18	9½—	*14+	5	11½	8½	7	4½	9	102½
B. G. and W. D. Dron	B 30626	B 29538	28/5/59	89	68	12	13½	8—	12+	4½	9½	6½	7½	4½	7½	85½
Class A Baconers																
							Maximum points (20)								(5)	
N.Z. Pig Pro. Council	LW 14950	LW 14312	26/10/58	114	125	20	18	4½+	16—	4	11	8	6½	4	4½	96½
N.Z. Pig Pro. Council	LW 13098	LW 14348	7/11/58	105	137	25	18	8½+	17—	3½	11½	6	7½	5	5	107
Class B Baconers																
N.Z. Pig Pro. Council	LW 14907	LW 14044	27/12/58	104	130	11	12½	9½+	17½—	1½	9½	7	7½	4½	4½	85
Class C Baconers																
N.Z. Pig Pro. Council	LW 14894	LW 14557	31/12/58	93	127	20	18	7+	17½+	4½	8	8½	8	5	4	100½

+ Points lost because too much fat. — Too little fat. L. Loin development. B. Belly thickness. M. Marketing points.
* One porker and one baconer appraised. Points for loin fat and marketing adjusted to conform with porker maximum.

Recent Research Work

TAINUI AND GABO WHEAT TRIALS IN RANGITIKEI

THE Rangitikei is one of the important wheat growing districts of the North Island. A large amount of field research on wheat growing has been carried out by the Department of Agriculture in this area and much valuable information has been obtained. One of the research projects of recent years has been the comparison of the Australian variety Gabo with Tainui. Gabo showed promise in early plot trials and subsequently comparisons were carried out on a paddock scale; an acre of Gabo was sown as a block in a paddock of Tainui.

In contrast to the replicated plot trials, where the hand sampling technique is used for harvesting, the block trials are harvested mechanically with a header harvester. Four Tainui-Gabo block trials were carried out between 1955 and 1959 and each year Gabo outyielded Tainui by a margin of 2 to 11 bushels per acre. The yields in bushels per acre were:

		Tainui	Gabo
1955-56	South Makirikiri	40.2	44.2
1956-57	Bonny Glen	40.6	51.4
1957-58	Bulls-Turakina Road	49.1	51.6
1958-59	Cliff Road	39.4	41.7

GENERAL CHARACTERISTICS

THESE trials were very useful in assessing the general characteristics of each variety. Tainui produced good yields in good wheat growing years, but in wet and windy seasons it did not yield as well because of lodging, fungous diseases, and weed smothering. Tainui, however, had the virtue that the seed would not shake from the head or sprout in the ear in unfavourable weather.

Gabo yielded very well. It was fairly resistant to fungous diseases and its upstanding growth made it ideal for heading. It was, however, subject to bird damage when the seed was at the milky stage and was inclined to sprout in the ear if rain came just before harvesting.

In the 1958-59 trial the wheat was grazed in the early stage. The grazing did not affect the quick-growing Tainui, but gave the Gabo a severe check from which it did not recover and the Gabo plants remained stunted throughout the season. It appeared before harvest that Tainui would give the heavier yield, but Gabo unexpectedly outyielded it by a slight margin. The yields of Gabo throughout the district in that season were substantially greater than those of Tainui.

—A. K. BOOTH, Farm Advisory Officer,
Department of Agriculture, Wanganui

HEADING PHOTOGRAPH: The 1956-57 season's block trial, with Tainui in the foreground showing extreme lodging and Gabo in the background standing well.

* * * *

Autumn-saved Grass in South Canterbury

THE saving of autumn grass is not a widespread practice in South Canterbury, but some farmers shut up either new or young (2- to 3-year-old) grass paddocks in February-April for rationing to stock during winter and early spring. Few farmers who use this method of feed conservation have considered topdressing the areas with nitrogenous fertilisers at closing up.

APPLICATION OF NITROGEN

IN 1956 a trial was conducted at the Adair Soil Conservation Farm to find out how much autumn grass could be saved by applying different rates of nitrogenous fertilisers at different times in autumn. This showed that, because of the district's usually dry January-February period, when autumn grass is saved paddocks should be shut up as soon as autumn showers begin so that as much growth as possible can take place before the onset of frosts. The trial also showed that the application of nitrogen at shutting up is good farm practice.

Unfortunately, severe summer drought delayed the laying down of the trial and the first nitrogen application was made later than intended. However, very mild weather prevailed until the middle of July and it is probable that the trial grew under conditions similar to those experienced by autumn-saved grass shut up in an "average" March, with frosts beginning, as is more usual, in May and June.

Times of application were: Mid April, 12/4/56; end April, 1/5/56; mid May, 14/5/56. Rates of application per acre were: Control (not topdressed), 1 cwt of an ammonium nitrate-lime mixture, 1 cwt of sulphate of ammonia, and 2 cwt of sulphate of ammonia.

When the trial was mown on 19 July 1956 the following dry matter yields (lb per acre) were obtained:

	Date applied		
	Mid April	End April	Mid May
1 cwt of ammonium nitrate-lime mixture	1,120	810	760
1 cwt of sulphate of ammonia	1,070	850	860
2 cwt of sulphate of ammonia	1,370	1,310	1,290
Control	580		

ADVANTAGE OF SULPHATE OF AMMONIA

In the nitrogen treatments more grass was saved by applying 2 cwt of sulphate of ammonia than by using either 1 cwt of sulphate of ammonia or 1 cwt of ammonium nitrate-lime mixture.

Though the trial was carried out in a reasonably good season and the good results obtained could not be repeated every year, more use could be made of autumn-saved grass, particularly when autumn rains fall after a dry summer and there is a shortage of winter feed.

It must be emphasised, however, that because of South Canterbury's very variable autumn climate, it would be unwise to rely on autumn conditions to provide grass as the main source of winter feed if other winter feed can be grown. Even where nitrogen is applied a dry autumn or early winter with cold soil temperatures will favour very limited grass growth. For this reason good grass growth responses cannot be expected every autumn.

—C. C. S. McLEOD, Farm Advisory Officer,
Department of Agriculture, Timaru

Care of Livestock during January

Contributed by the Animal Research Division

LAMB WEANING

WEANING is an important event in the life of a lamb and special care at this time will be well repaid. Long wool lambs should be shorn and all others crutched.

Hogget ill thrift in the North Island seldom manifests itself before the flush autumn growth appears. Before this time lambs should be given the pick of well controlled pastures, as these give best liveweight gains. At first sign of failure to do well on such feed they must be given the longest and most mature feed available. In most districts preparations to have such feed available must be made before the summer dry spell.

The hoggets should be stocked as lightly as possible for best results. Drenching is seldom necessary during the dry period, and the first drenching should be about two weeks after rain and should always be followed by an immediate shift into a clean paddock, preferably prepared in advance by cattle. Drenching of the hoggets may be necessary at about three-weekly intervals during warm, humid conditions.

TEST FOR COBALT DEFICIENCY

Cobalt deficiency may be a cause of unthriftiness in lambs from an early age, but is more likely to be important from about weaning time onward. If the disease is suspected, a trial should be conducted to measure the effect of dosing with cobalt. Cobalt bullets are very suitable for this purpose. Local officers of the Department of Agriculture should be consulted about the planning of such trials

LAMB FATTENING FODDERS

Rape should not be grazed until the leaves show a purplish tinge. "Unripe" rape does not fatten so quickly and seems to scald more readily. Best results are probably obtained by grazing lambs in breaks which last them about a week. It is false economy to keep lambs on a break until the last leaf is eaten. Move them on while they are still getting a full feed. The paddock can be cleaned up with ewes. Run-offs have little to recommend them and unless they contain good pasture they will depress the lambs' rate of growth. If hay is fed, it must be of the very best quality.

Other fodder crops can give poor results if immature. Chou moellier, unless sown early in October, will not be readily eaten in January and February. Fed later the same crop gives excellent results. Thousand-headed kale is splendid lamb-fattening fodder, but because it is relatively unpalatable it must be managed properly. Always feed in small breaks and graze only lightly before moving on to the next break. Never use a run-off. Treated in this way kale makes excellent regrowth and can be regrazed several times. If necessary, grazing can be extended into autumn and winter.

EWE CULLING

After weaning, the ewes should be gone through carefully with a view to selecting those which require culling. Feet and wool should be examined carefully. Special attention should be paid to udders and teats, and ewes should be culled if they have defective udders or very large or damaged teats. The lambs of such ewes often die from starvation before they are a week old. Provided ewes are in reasonable condition and have sound udders and good fleeces, they should be retained. Even "gummy" ewes will rear satisfactory lambs on good pasture. Lambing percentage increases with age, reaching the highest level at five to eight years. Many ewes on fat lamb farms could well be kept for one or two years longer. Fat ewes which have not reared a lamb should be culled. Ewes should be kept on low rations during the next two months to prevent their becoming overfat.

FOOTROT ERADICATION

Campaigns for footrot eradication should be started as soon as the lambs have been weaned. Once footrot has been eradicated from a flock it does not recur unless it is reintroduced from outside. Department of Agriculture Bulletin No. 325 gives full instructions for eradicating footrot from a flock.

ERGOTISED GRASS MAKES DANGEROUS HAY

Serious lameness in cattle can be caused if they eat hay heavily infested with ergot. Such hay can be easily recognised from the presence of the black ergots, which replace the seeds of ryegrass and other grasses. Where ergot is known to occur hay should be made before the grasses have time to seed.

SHEEP DIPPING

Modern dips are so effective that the eradication of lice and ticks should be quite feasible. Best results, however, will be achieved only if the instructions for mixing and replenishing dips are followed accurately. Carelessness in dipping can cause disastrous losses. If sheep are dipped off shears, the shear cuts are liable to become infected and deaths from blood poisoning may occur. These can be prevented by vaccinating with blackleg vaccine at least a fortnight before dipping. The vaccine is available at a reasonable price. Departmental Veterinarians or Livestock Instructors should be consulted regarding its use.

ST. JOHN'S WORT MAKES DIPPING DANGEROUS

Sheep that eat St. John's wort become sensitive to sunlight and scabs develop on the ears, face, and back. If sheep in such condition are dipped, they take convulsions and may be drowned. If possible, sheep should be grazed on country free from St. John's wort for several weeks before dipping. If this is not possible, dip on dull days only.

CATTLE ON HILL COUNTRY

On hill country where cattle are kept primarily for development work the bulls, put out in late October, can be removed and the calves weaned at the end of January or early February. This leaves the herd unencumbered and available for useful work. Calves early weaned on hard country at an average age of four to five months may not do quite as well in their first year as those late weaned, but suffer no permanent disadvantage and by mating time at two years are as well developed as those late weaned.

Crop and Pasture Production

Seasonal Notes by the Farm Advisory Division

HARVESTING CHOU MOELLIER AND RAPE SEED

CHOU moellier and rape seed crops are ready for cutting when the majority of the pods have turned golden brown and when the seeds in the lower, more mature pods have started to turn brown. However, as most crops tend to ripen unevenly owing to soil variations in paddocks a decision on cutting is often very difficult to make. When a decision is being made the only reliable method is to take a representative sample of heads from throughout the crop. Cutting too early will result in shrivelling of the seed and excessive loss of weight; leaving the crop too long can result in heavy losses from shaking, particularly in rape. It is often wise to open a crop up a day or so before it is at the optimum stage for cutting to ensure that the binder is working efficiently and to allow quick progress should the weather be unfavourable.

Crops are usually cut with a binder into sheaves or windrowed. Windrowing, though satisfactory for chou moellier crops, is not recommended for rape, as seed losses from shaking can be extremely high in strong winds. Stooking, though sometimes adopted in chou moellier crops, is not necessary for rape. The sheaves, however, should be lifted up on to the stubble for even drying and left from 10 to 14 days for the seed to mature,

The header, with a small canvas-covered platform attached to the front, is now generally used for threshing. The normal practice is to fork the sheaves on to the platform, where one man cuts the strings and then feeds the straw evenly into the drum as the header moves round the paddock. The drum of the header should be set wide open and the speed reduced as low as is possible consistent with thorough threshing to ensure a good sample with a minimum of split or shelled seed.

Chou moellier crops are sometimes direct headed, but it is not recommended unless the crop is so badly lodged that cutting with a binder is practically impossible.

—*J. L. SYMONS, Waimate*

* * *

SPRAYING BLACKBERRY

THE best time to spray blackberry is summer and early autumn. Plants should be in full leaf, with the second-year canes fruiting or past fruiting. Spray in fine, warm weather with 2,4,5-T at 1 fl. oz. (2 tablespoons) of 2,4,5-T concentrate per gallon of water or 2 pints of concentrate per 40 gallons of water. At this rate 1 gallon of 2,4,5-T concentrate is required per acre of dense blackberry. Thorough wetting of the foliage and complete cover of all leaves and canes are necessary.

Even when blackberry has been sprayed most carefully, there is almost always some regrowth, and two or three follow-up treatments are necessary for a complete kill. Blackberry cannot normally be eradicated with one spraying.

Large areas of blackberry on tractor country should be crushed, burnt, and regrassed. Topdressing and stocking the regrassed area will control the blackberry regrowth to some extent. Plants that persist can then be controlled by mowing or killed with spray.

—*M. G. BOYER, Te Awamutu*

* * *

HARVESTING PEAS

TWO methods are adopted for harvesting garden peas. The first gives a better colour to the produce, a desirable feature for the market. The crop should be cut when the top pods are just past their best for table use. The peas are then left to mature in the swath for a week or longer before threshing, which involves a risk of wind and rain damage. The less handling the crop receives, especially in hot weather, the less will be the loss from shelling. The second method is to leave the crop until it is header ripe, when it is cut with the mower directly in front of the header harvester. The use of pea lifters and a "gooseneck" may be warranted to handle the crops. Field peas are usually best direct headed. Care is necessary in the threshing of the crop to avoid damage to the peas. A relatively fast drum speed with the concave set fairly wide is a usual setting. Samples of the threshed peas should be inspected from time to time during the day, as alterations to the setting may be required, particularly if there is a change from nor'-west to easterly conditions. To condition the peas after threshing sacks should be left in the paddock for a few days or placed on the gratings of a woolshed floor.

—*P. R. BARRER, Christchurch*

* * *

MANAGEMENT OF WEANED LAMBS

IT is necessary to plan ahead for weaning particularly if lambs are to be weaned on to pasture. Only clean, spelled grass of good quality can be expected to fatten lambs quickly. When feed is approaching short supply an endeavour should be made to wean before the critical stage is reached. Ewes can then be put on a maintenance ration and the lambs spread over a greater area. Generally lambs tend to thrive best when lightly stocked on "clean" pasture. When feed is limited fatteners should be drafted from replacement lambs and given preference.

Where fodder crops are provided best results are obtained if the lambs are given small breaks and moved to fresh feed frequently. Run-offs have little merit, unless they are necessary to provide a water supply. Rape crops should always be mature before grazing and chou moellier crops should be watched closely for signs of unpalatability and toxicity.

Crutching at weaning is desirable. Drenching is seldom necessary at this stage, but thereafter regular inspection should be made for signs of parasitism. Under humid conditions drenching every three to four weeks may be necessary. Care should be taken not to drench or handle lambs excessively under hot, dry conditions. If driving and holding cannot be avoided, provision must be made for ample shade and water. Regular and frequent shepherding must be carried out during the fattening period, as lambs often fail to thrive under apparently ideal conditions and even a short period of neglect may mean a rapid loss of condition.

—*M. L. CAMERON, Timaru*

* * *

ARMY WORM CONTROL IN MAIZE CROPS

ARMY worms and cutworms often appear in maize crops in January and February. If left unnoticed or if control is delayed for even a few days, a heavy crop can be completely defoliated. A close watch should therefore be kept for the appearance of nocturnally active caterpillars, ½ to 1½ in. long, in the crop. They may be green, various shades of khaki and brown, or even black. A further identifying feature is that the caterpillars twist into a coil when disturbed.

A cheap and very effective method is to spread through the crop by hand or by blower topdresser a bait composed of 30 lb of bran, ½ lb of 50 per cent DDT, and 5 lb of molasses. The insecticide is easily mixed with the bran in a concrete mixer, after which it is advisable to wet the mixture to ensure that the DDT sticks to the carrier. The molasses may be added with the water. The insecticides mentioned are harmful to honey bees, and care must be taken that there is no drift on to areas where bees are working.

—*B. A. GUNNING, Matamata*

Book Review

"Grass Productivity": Andre Voisin

ANDRE VOISIN is a French farmer and biochemist whose recent book "Grass Productivity" has been hailed by some British reviewers as a farming classic. Probably the reason for this is that the book breaks new ground in European agriculture, as it deals more particularly with grazing than with grass, and the title could be more appropriately "Cow Productivity". As Voisin says, "Text books on animal nutrition devote only a few words, out of politeness, to grazing, although this feeds the animals for eight months out of twelve. They are almost solely concerned with stall feeding. Very little is written about the practical management of grazing or its principles".

Voisin proceeds to rectify these omissions by writing over 350 pages on the grazing of pastures. Because of this his book will have particular interest to New Zealand farmers, particularly dairy farmers.

In fact many of his views will be more acceptable here than in Europe. He has no high regard for leys, but prefers old pastures. He regards clovers as being useful not only for feed but for supplying nitrogen to other associated plants, and he regards grass as the main food for high production, and not just a tonic for stall-fed animals or a supplement to concentrates. His plans are laid to provide his cows with as much good grass as possible over the grazing season by judicious grazing, using the electric fence.

However, in dealing with the peaks and troughs of seasonal production, he makes very little mention of closing up grass for hay or silage, a practice we in New Zealand are accustomed to follow to even out production.

The author draws much of his information about the behaviour of dairy cows from work by J. J. Hancock and others at Ruakura, though it is obvious that he has searched world literature on grassland management to build up an interesting story.

To those who have little time to read original papers, such a digest is refreshing, particularly since Voisin has the knack of writing in clear, concise prose that farmers can understand. Catherine Herriot, who did the translation from the French, has done a good job in maintaining the interesting style.

Though one cannot agree with all the claims made by the author, the book is stimulating because of its practical approach to the potentialities of grassland and its use by the grazing animal.

But it is not merely techniques of grassland management that Voisin deals with, it is grazing management; and he does not advocate rotational grazing so much as "rational" grazing.

Principles expounded by Voisin are: A pasture cannot achieve its maximum productivity unless it is given a rest between grazings, and the interval varies according to seasonal conditions; the grazing periods should be short so that the new growth is not retarded; the cow cannot achieve maximum production unless she is capable of harvesting very large quantities of grass during the eight-hour daily grazing period; the highest producers must therefore have the first choice of the grass available.

Voisin gives rather lengthy details of how these principles are applied to his farm in Normandy on which he produces 205 lb of butter per acre from grass during the grazing season (April to November). His examples of dividing pastures by electric fences are of interest, but he maintains that subdivision is "not an end in itself, but a means of helping to satisfy, by judicious compromise, the requirements of animal and grass".

In his foreword to the book Professor M. McG. Cooper, a former New Zealand Rhodes Scholar, commends Voisin's dual consideration of both plant and animal, and considers that his book will stimulate a new approach to the treatment of permanent pastures in Britain, though "Mac" Cooper also has a sneaking suspicion that Voisin is sometimes "trailing his coat". Many other people will also consider the book provocative, but in the midst of the present controversy about such things as set stocking and rotational grazing those who make up their minds and say so emphatically create some opposition, but like Voisin they also stimulate a good deal of interest.

—*J.W.W.*

Crosby Lockwood (1959). 50s.

Meteorological Records for October

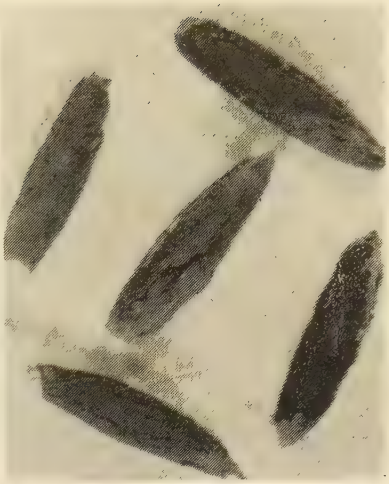
Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	58.0	+ 1.2	76.7	38.9	3.58	18	— 0.93	1.16	19	156
Auckland	160	57.9	+ 0.5	70.2	43.5	3.87	19	— 0.22	0.95	5	166
Tauranga	12	55.5	— 0.5	73.6	37.3	4.60	19	— 0.37	1.65	15	145
Ruakura	131	54.4	+ 0.1	70.7	34.5	5.74	17	+ 1.61	1.22	29	157
Whakarewarewa ..	1,006	52.6	— 0.4	73.5	33.6	6.31	17	+ 0.93	1.04	5	136
Gisborne	14	54.8	— 0.7	73.4	35.8	6.29	22	+ 3.86	0.96	15	121
New Plymouth ..	160	54.2	— 0.2	70.0	40.8	3.79	14	— 1.84	0.84	24	179
Karioi	2,125	47.6	— 0.6	67.1	28.7	4.37	15	+ 0.12	0.86	5	
Napier	5	55.0	— 1.5	79.2	37.4	9.40	14	+ 7.50	6.39	15	147
Wanganui	72	52.6	— 2.2	68.0	35.0	3.84	11	+ 0.62	0.92	14	164
Palmerston North ..	110	52.4	— 1.5	71.8	33.7	3.19	13	— 0.37	0.93	24	144
Waingawa	340	51.0	— 1.7	71.0	33.0	4.67	17	+ 1.71	1.12	15	150
Wellington	415	50.8	— 2.0	65.6	38.3	3.88	13	— 0.35	1.12	15	180
Nelson airfield ..	5	50.6	— 1.6	66.8	31.7	1.63	5	— 1.71	1.34	23	230
Blenheim	12	52.5	— 1.2	72.9	29.4	2.20	7	+ 0.00	1.10	23	230
Hokitika	15	49.4	— 1.6	68.0	30.8	4.84	12	— 6.18	1.03	1	219
Hanmer	1,270	46.8	— 3.8	71.1	25.7	5.86	16	+ 1.96	1.80	16	193
Christchurch ..	22	50.2	— 2.9	72.9	31.2	1.18	12	— 0.77	0.44	14	223
Ashburton	323	50.0	— 2.4	79.0	28.6	2.49	12	+ 0.07	0.96	14	202
Timaru	56	50.9	— 1.8	73.9	31.3	1.20	9	— 0.73	0.41	14	234
Alexandra	520	50.6	— 1.8	73.5	25.8	0.90	5	— 0.32	0.70	13	251
Taieri	80	48.9	— 2.2	73.8	31.0	1.73	13	— 0.33	0.54	13	188
Invercargill airfield ..	0	47.6	— 1.4	64.3	30.1	3.15	16	— 0.33	1.00	4	180
Chatham Islands ..	150	49.2	— 0.7	58.9	36.6	5.14	19	— 3.21	1.18	16	

SPEEDWAY
STERILISER
BURNS OIL OR WOOD
Write for FREE
Illustrated Catalogue
SPEEDWAY PRODUCTS LTD
GT. SOUTH ROAD, PENROSE
P.O. BOX 24 and at
FORD BUILDINGS, COURTENAY PLACE
WELLINGTON
139 WORCESTER ST. CHRISTCHURCH
STEAM & BOILING WATER

Clover Case-bearers

By L. J. DUMBLETON,
Entomology Division,
Department of Scientific and
Industrial Research,
Nelson

THE value of the white clover seed industry approaches £1,000,000 annually. The economic loss that may be caused by any pest of this crop can therefore be considerable, particularly if the pest is of the nature of the clover case-bearer, which causes apparently insignificant damage at the time of the attack and which raises a difficult problem of control. The extent of damage may be realised only when the seed has been harvested and it is little consolation then to know that treatment at the obvious time (at flowering) may seriously reduce seed setting of the crop through its effect on honey bees.



Case-bearers are so called because caterpillars are enclosed in a case spun within the remains of a clover floret.

TWO species of *Coleophora* are known in New Zealand. These are *C. spissicornis* (banded case-bearer) and *C. alcyonipennella?* (white-tipped case-bearer).

Both are introduced insects, no native species of the genus occurring in New Zealand. The banded case-bearer was collected on Banks Peninsula in 1922 and it was recorded from Whangarei in 1930. It was evidently widespread even then. The very similar white-tipped case-bearer was not recognised until 1952, but it also has probably been present and widely distributed in New Zealand for many years.

They are called case-bearers because the larger caterpillars are enclosed in a case spun within the remains of a clover floret. The common names refer to the colour pattern of the apical half of the antennae of the moths—with bands or rings of white in one and unbanded white in the other.

Damage

It seems likely that the increased importance of these case-bearers is due to

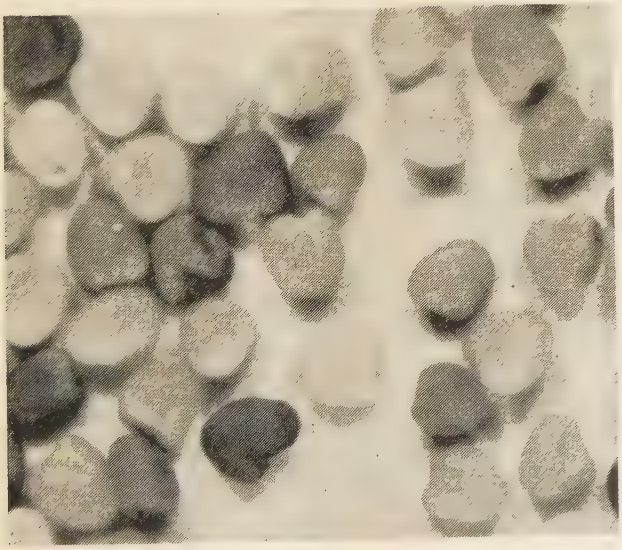
(a) The general improvement of pastures and the increase in white clover in pastures generally and

(b) The increase in white clover areas saved for seed.

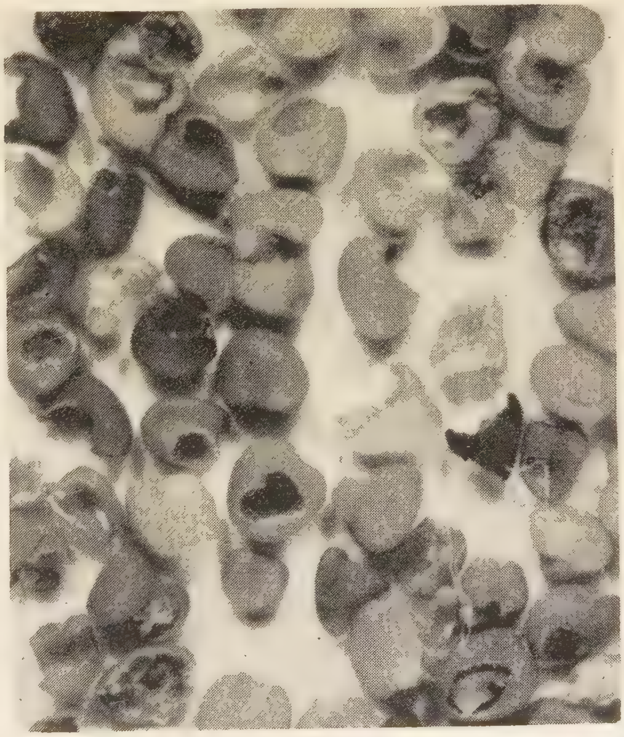
Damage to seed was first brought to notice in the early 1940s in the Rangiora and Hastings areas. It has since been important in Mid and South Canterbury so that the main white clover seed producing areas are all affected. There is some evidence to indicate that the level of damage is greater in South Canterbury than in other areas.

White Clover Seed

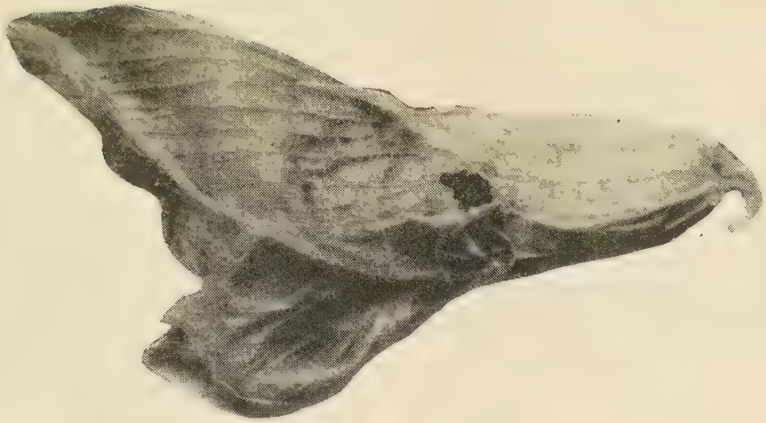
Undamaged.



Damaged.



CLOVER CASE-BEARER



Clover flower showing hole made by caterpillar on its way to seed pod.

The incidence of attack in fields in any district seems, on present knowledge, to be quite irregular and arbitrary and it is impossible before the moths actually fly to forecast which fields are likely to be severely attacked. There appears to be a definite tendency for damage to be greater in fields being harvested for a second white clover seed crop, but this is not invariably so.

The actual damage is caused by the caterpillars of the moth. At first they are small enough to get right inside the small green seeds in the pod, but later they are too large to get inside the full-sized but still green seed and they then eat an irregular hole into the seed or through the seed. The damage is done in the field to seed which has not yet hardened and ripened. Damage does not continue in the bag or in the store.

Present indications are that the level of damage depends mainly on the size of the moth population in flight in mid December and that it is likely to be higher if the moths flying are predominantly those of the banded case-bearer (*C. spissicornis*). Though very large numbers of moths of the white-tipped species may be observable in the field in late January, only a small percentage of the total seed is set after that time and these moths have little effect on the level of damage to seed harvested about the end of January.

Damage by case-bearers to red clover seed is recorded in Europe and has also been recorded in New Zealand, but the position is not quite clear. Another insect, the red clover seed chalcid, commonly does rather similar damage to red clover seed in New Zealand.

The average level of damage to white clover in South Canterbury in one season was 10 to 15 per cent; a few first white clover crops had as much as 30 per cent and a few second white clover crops as much as 50 per cent damage. The average level of damage in other districts in that season was a good deal lower.

The moths are easily seen on the clover heads and are ¼ in. long and dark but with a distinct brassy sheen in certain lights. When the wings are folded on the resting moth the body appears long and narrow. The level of moth population can be measured only by sweeping the clover with an insect net and expressing the result as a number of moths for a certain number of sweeps of a net of a specified size.

The next indication of damage is the appearance of holes bored through the side of the floret near the base. Later the brown cigar-shaped cases or cocoons, about ¼ in. long, appear in the head and rubbing out the seed in the head shows many seeds reduced to shells or with holes in them.

Life History

The life history of the two species, with one important exception, is very similar. The banded case-bearer (*C. spissicornis*) has only one brood a year, while the white-tipped case-bearer has about three broods a year. In spite of this it is considered that the single-brooded moth is the more injurious of the two.

The first broods of both moths are flying at peak numbers about mid December. They emerge from cocoons in the soil and there is evidence that as larvae they pass **two** consecutive winters in the soil before the adult emerges. This fact has important implications in the process of infestation of the field and in control.

The female moths lay one or two eggs per floret in the **open** florets on the clover heads. The eggs hatch in about 10 days and the larvae at first feed in the young green seed in the pod inside the floret. Later they feed in larger but still soft seeds and they move about on the head and between heads. Larvae feed for about four weeks and when larger probably destroy the seeds in several florets per day. The larvae of the banded case-bearer when fully fed hibernate for the two following winters before emerging. The larvae of the other species pupate in the cocoon and another (second) brood of moths emerges with a peak toward the end of January, and this may be followed by a third brood of larvae and moths before the larvae hibernate for the two following winters.

Control

No control measures can so far be recommended. Chemical control experiments in Canterbury in the past two seasons have failed to give conclusive results owing to adverse seasons or to difficulties in experimentation.

Present information is that on young pastures no benefit is likely to result from application of insecticides to the soil before shutting-up, since it appears that the moths which lay eggs in the clover heads come not from the soil in the field but from adjoining fields.

In considering alternative chemical control methods, applied when the clover is flowering, due attention must be given to the employment of insecticides which do not have a disastrous effect on the pollinating honey bees. DDT, toxaphene, and strobane are stated to be safe to apply to white clover at periods when honey bees are not flying, but at present we have no information on the relative toxicity of these different insecticides to case-bearer moths nor on the best timing of insecticide applications. A spray directed against the first brood moths about mid December (or two sprays, before and after the moths' peak of flight) would appear likely to be the most effective.

There appears to be no feasible way of modifying the management of the clover crop to reduce or eliminate the case-bearer damage.

Parasites have been investigated in Europe and some parasite material has been received in New Zealand, but difficulties have arisen in acclimatising these to the Southern Hemisphere. Investigations in Europe to secure other parasites are continuing.

SUBSCRIPTION RENEWALS

Renewals of subscriptions to "The New Zealand Journal of Agriculture" should be paid to the nearest office of the Department of Agriculture. Subscribers can ensure continuity of delivery by paying their subscriptions as soon as possible after receiving their renewal notices and at least one month before the old subscription expires. When payment is made the renewal notice should accompany the subscription to ensure that the correct details are recorded.

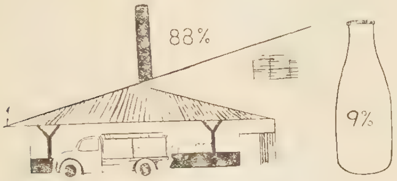
Consumption of Dairy Products in New Zealand

This article is an adaptation of a paper by J. V. WHITE, Rural Economist, Department of Agriculture, Wellington, for the 1959 International Dairy Congress in London.

IT is sometimes said that the cobbler's children are the worst shod and the tailor's the worst clad. It is often true that in some countries where dairy production is considerable consumption is much lower than it should be. Probably in most of the major dairying countries people do not get sufficient of at least some of the more important dairy products, including liquid milk. However, this does not apply to New Zealand, as the following analysis will show.

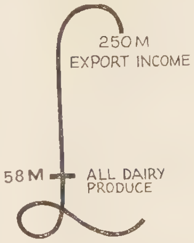
WITH the exception of cheese, consumption of the major dairy products is high in New Zealand. Cheese consumption is low because of the very high consumption of milk and meat.

Consumption of any commodity is affected by a number of factors connected with the physical, economic, and social conditions in a particular country, and to obtain some appreciation of consumption trends in dairy produce it is necessary to take these factors into account.



New Zealand has about 2 million dairy cows in milk and about 1 million other dairy stock. Approximately 88 per cent of all milk is used in manufacturing, about 9 per cent is consumed as liquid milk and cream, and the small residue is fed to livestock, used for making farm (home-made) butter, and spilt and wasted.

Of the milk used in manufacture 80 per cent is made into creamery (factory) butter, 18.5 per cent into cheese, and the balance into condensed milk and whole-milk powders, including baby foods. Eighty per cent of the butter and 95 per cent of the cheese are sold overseas. In 1958 New Zealand exported 175,000 tons of butter, 89,000 tons of cheese, and 53,000 tons of processed milk products. Their total value was £58½ million or 23 per cent of New Zealand's total export receipts.



Dairying for export is concentrated mainly in Auckland and Taranaki Provinces, where climate and topography are particularly well adapted to dairy production, but in no district are physical conditions too difficult for dairying. Even the major cities can obtain most of their requirements from within a radius of 40 or 50 miles. Smaller centres can meet their requirements almost from within their own boundaries. Hence supply of dairy products presents no major problem except very temporarily in a particularly difficult season.

Ability to Buy

New Zealand incomes are high; according to United Nations statistics we have the fourth highest income per head in the world. Furthermore, this income is very evenly distributed. The latest figures of distribution of incomes (for the year 1954-55) show that only 27 per cent of incomes were less than £600 and only 4.5 per cent were over £2,000. Included in the lower group there are, of course, incomes of young single people without family responsibilities. Under these circumstances there is no economic bar to the consumption of dairy products.

The well established position of these products in the dietary pattern of the average New Zealander has been consolidated by two important factors operating since the Second World War:

1. Butter and milk both carry consumer subsidies. Butter has been subsidised since 1943 and milk since 1944. The extent and effect of these subsidies are referred to later.

2. The great importance which nutritionists attach to milk as a food and the publicity given to this, principally by the Department of Health. The importance of milk as a food for children was the reason for introducing the milk in schools scheme.

In New Zealand, therefore, all the conditions which favour high consumption of dairy products exist:

- They are readily available.
- Their food value is appreciated.
- Consumers can afford to buy what they need.

A problem in assessing consumption of dairy produce, particularly milk, is estimating the amounts used by farmers for their families and for feeding to animals.

In New Zealand only about half the total number of farms can be described as dairy farms; that is, where dairying provides the major source of income. But many farms have at least a few cows in milk. Out of 67,875 farm holdings with cows in milk 27,213 have only one to four cows. Most are sheep farms, frequently in isolated localities where it is not possible to obtain commercial supplies of milk and sometimes butter. There are also a number of small holdings adjacent to towns on which a cow or two is kept.

Hence assessments of milk consumption cannot be more than approximate, though the greater part of the milk used can now be accurately accounted for. Very little butter is made on farms, because the consumer subsidy makes such a practice quite uneconomic.

Marketing

Up to the mid 1930s the marketing of all dairy produce, particularly milk, was relatively unorganised. With the introduction in 1936 of the guaranteed price scheme for butter and cheese organised marketing became essential. Some years later there followed the gradual rationalisation of the town milk industry. This action was com-

OVER THE WIRE ...
IT'S

Johnson's 12½ gauge Super Dreadnought is economical for high country. It yields 1458 yards to the cwt. as compared with 546 yards for 8 gauge and has equivalent breaking strength.

JOHNSONS'

Yes, farmers all over the world know that Johnsons' English Wire stands up to hard work and weather alike. Drawn with the skill of 150 years' experience it is protected by patented Hot Dip Galvanising which ensures long life in New Zealand climatic conditions. Johnsons' English Wire is particularly resistant to the corrosive action of salt-laden air.

JOHNSONS' ENGLISH FENCING WIRE

MANUFACTURED BY: RICHARD JOHNSON & NEPHEW LTD. MANCHESTER, ENGLAND
OBTAINABLE FROM STOCK & STATION AGENTS & HARDWARE MERCHANTS EVERYWHERE
Sole New Zealand Agents: JOSEPH NATHAN & COMPANY (N.Z.) LIMITED
WELLINGTON (Head Office) AUCKLAND CHRISTCHURCH DUNEDIN

---

spray not later than two weeks before harvest in spring and summer

with ROGOR 40

the NEW
Systemic Insecticide
for Commercial Growers

Here is a new, safe, more effective pest killer for fruit and vegetable crops . . . Rogor 40—a Contact/Systemic Insecticide which combines medium toxicity to human beings with true systemic and persistent action against a wider range of pests. Field crops—orchard and fruit crops—market gardens—nurseries and flower crops . . . all can be kept free of aphids, thrips, spidermites and other pests with Rogor 40.

- Rogor 40 can be handled and applied safely.
- Produce is safe to use sooner.
- Contact action gives rapid knockdown of pests.
- Persistent systemic action ensures longer lasting control.

Spray not later than four weeks before harvest in autumn and winter for pip and stone fruits, and not later than six weeks for vegetables eaten raw.

Sole New Zealand Agents:
THE CANTERBURY (N.Z.) SEED CO. LIMITED,
208 Cashel Street, Christchurch—
from whom technical advice is available. If unable to obtain from your normal Stockist, write to the Distributors for name of nearest Supplier.

A Product of
FISONS Pest Control Ltd.,
Cambridge, England.

R.3

pelled as much by existing costly duplication of services and poor quality as by the need for coordinating the producer price of milk with the new fixed prices of butter and cheese.

At first the handling of butter, cheese, and milk for domestic consumption was controlled by the Internal Marketing Division, which also exercised control over a number of other products such as eggs and citrus fruits. However, after the war marketing of butter and cheese both for export and local consumption was taken over by a quasi-State organisation, the Dairy Products Marketing Commission, and control of milk marketing passed to the Central Milk Council. Comprised of representatives of producers, vendors, consumers, and the Government, it was formed to organise supplies throughout the country.

This is not the appropriate place to diseases the relative merits of the various systems, but it is important to note that one offshoot is the preparation by the bodies concerned of accurate and reasonably comprehensive statistical coverage of the quantities going into consumption from the time the organisations began to operate.

Hence the figures shown in the tables are a mixture of firm figures for the years since about 1938 or 1939 and fairly approximate estimates for the earlier years. Consumption figures for the earlier periods can be arrived at only as residuals from an estimate of production and the disposal of that production. As the estimate of production cannot be more than approximate and no details of stocks in hand are available for periods before 1938 or 1939, the figures cannot be regarded as anything more than approximations.

TABLE 1—PRODUCTION AND CONSUMPTION OF LIQUID MILK

Year	Production	Consumption Total	Consumption Per head	Percentage of production
	million gallons	million gallons	pints	
1902-06 (average)	154.2	17.6	166	11.41
1921-25 (average)	528.0	31.8	194	6.02
1933-34-1937-38 (average) ..	988.0	64.6	325	6.54
1938-39	891.9	77.0	*382	8.63
1939-40	951.2	77.7	*381	8.17
1940-41	1,018.9	77.0	*377	7.56
1941-42	954.5	77.3	*379	8.09
1942-43	893.4	79.6	*388	8.91
1943-44	859.8	77.8	*380	9.05
1944-45	940.7	74.5	*358	7.92
1945-46	817.1	77.2	361	9.45
1946-47	885.6	78.7	356	8.89
1947-48	908.2	80.9	358	8.91
1948-49	983.4	83.4	356	8.48
1949-50	1,009.8	90.5	381	8.96
1950-51	1,063.6	92.1	378	8.66
1951-52	1,071.6	93.5	376	8.73
1952-53	1,133.4	95.9	379	8.46
1953-54	1,050.3	97.5	376	9.28
1954-55	1,076.8	98.6	373	9.16
1955-56	1,108.8	100.2	370	9.04
1956-57	1,094.2	102.8	373	9.39
1957-58	1,153.6	104.4	371	9.05

* Calculated.

Sources: 1902-06 and 1921-25, Department of Agriculture estimate; 1933-34 to 1957-58, New Zealand Dairy Board's annual reports.

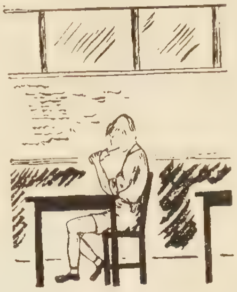
TABLE 2—PRODUCTION, EXPORTS, AND CONSUMPTION OF BUTTER

Year	Total production	Exports	Consumption Total	Consumption Per head	Consumption as percentage of Production	Consumption as percentage of Exports
	000 tons	000 tons	000 tons	lb		
1901-05 (average)	21.0	13.6	7.4	18.4	35	54
1921-25 (average)	70.0	52.5	17.5	28.8	25	33
1933-34-1937-38 (average) ..	169.2	140.3	28.9	41.2	17	21
1938-39	150.3	118.1	30.8	42.8	20	26
1939-40	160.3	130.4	31.1	42.6	19	24
1940-41	167.6	136.2	31.5	43.2	19	23
1941-42	136.2	103.5	32.8	45.0	24	32
1942-43	144.5	108.8	34.8	47.6	24	32
1943-44	139.7	110.6	29.1	39.7	21	26
1944-45	157.9	131.3	26.7	35.7	17	20
1945-46	130.3	106.2	24.2	31.3	19	23
1946-47	149.3	125.2	24.3	30.5	16	19
1947-48	155.6	129.6	25.6	31.5	16	20
1948-49	169.4	144.2	25.7	30.9	15	18
1949-50	171.9	144.3	28.0	33.0	16	19
1950-51	183.2	150.1	32.4	37.6	18	22
1951-52	191.0	155.6	35.7	40.5	19	23
1952-53	200.9	162.6	38.0	42.0	19	23
1953-54	184.0	142.7	40.0	43.1	22	28
1954-55	190.0	149.1	40.9	43.2	22	29
1955-56	203.1	162.8	41.6	43.1	20	26
1956-57	201.3	157.5	42.7	43.3	21	27
1957-58	217.8	173.4	42.8	42.4	20	25

Sources: 1901-05 and 1921-25, Department of Agriculture estimate; 1933-34 to 1957-58, New Zealand Dairy Board's annual reports.

Liquid Milk

Statistics of consumption of liquid milk and cream are shown in Table 1. The most striking feature is that consumption reached a high level in prewar years, when incomes were much lower than they are today. Figures for the earlier periods may appear to understate consumption, but it is likely that at that time consumption was much less not only because incomes were lower but because milk and cream were not always freely available in many centres, especially the larger ones, and the value of milk as a food was not fully appreciated.



Consumption of milk was greatly stimulated by the introduction in 1937 of the milk in schools scheme, the object of which is to provide each school child with ½ pint of pasteurised milk every school day. This scheme was expanded as rapidly as possible and today extends to all but the most out-of-the-way schools, where its need is, in any case, rather less. Over half of New Zealand's ½ million school children now receive ½ pint of milk on every school day.

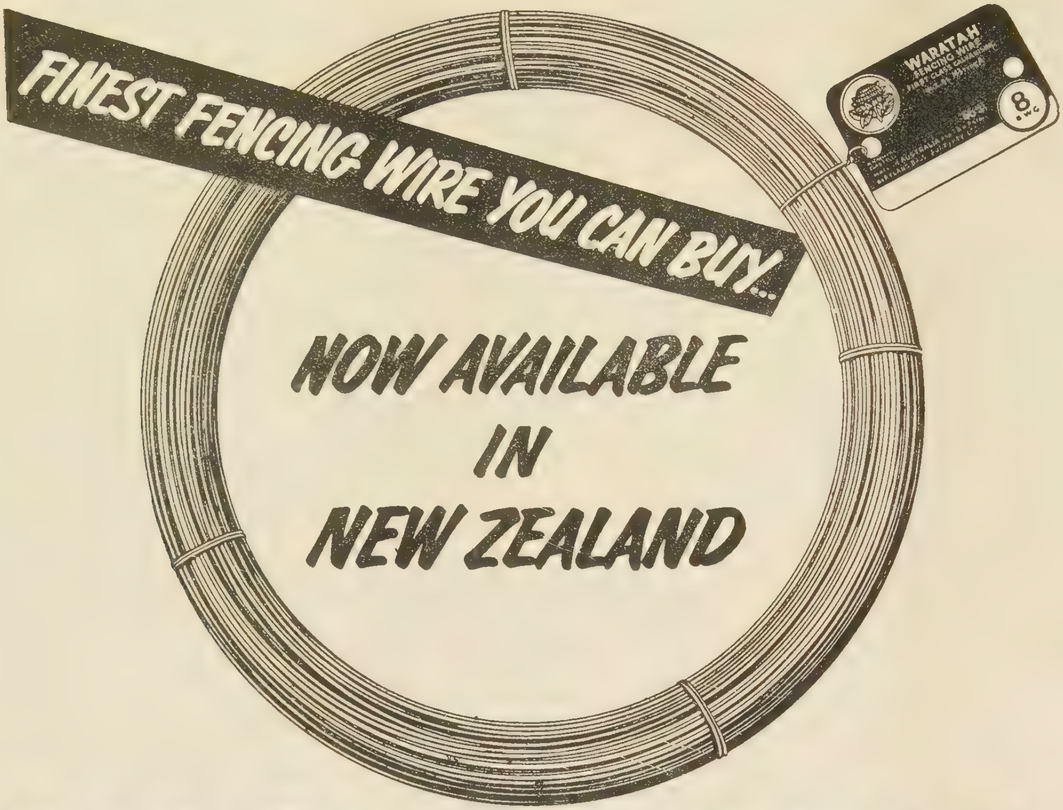
An interesting feature of Table 1 is that for the past 20 years, in spite of a population increase of over 2 per cent per year since the end of the war, consumption as a percentage of total production has remained almost constant, slight variations being the result of seasonal fluctuations in production.

Some of the fluctuations in annual consumption per head are difficult to explain. There is the difficulty, already mentioned, of estimating the amount of milk used on farms and in rural areas generally. Of total consumption of 104 million gallons in 1957-58 about 62 million gallons were supplied through milk treatment stations; the balance can be assessed only very approximately.

One possible explanation of the slight downward trend in consumption per head in recent years is that increasing use of household refrigerators—the 1956 census showed that 54 per cent of houses had them—has probably greatly reduced the waste of milk. In warm weather this would otherwise be fairly high.

Butter

Butter consumption in New Zealand, shown in Table 2, has been high for many years, even when incomes were


FINEST FENCING WIRE YOU CAN BUY...
NOW AVAILABLE IN NEW ZEALAND
WARATAH
FENCING WIRE
8

WARATAH FIRST CLASS GALVANISED FENCING WIRE

From the makers of the famous "Waratah" Steel Fence Posts now comes the finest fencing wire you can buy !

It costs less, even though made from the finest Australian steel. The first class galvanising of "Waratah" Fencing Wire is done by the world-famous Crapo process to ensure longer life and to resist the corrosive action of even salt laden air ! So why pay more ! SAVE by ordering "Waratah"—the finest fencing wire you can buy !

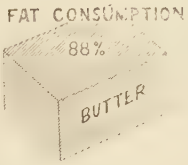
Guaranteed to comply with New Zealand Specification NZ SS 143 type A

"WARATAH" PROVEN QUALITY IN STEEL FENCE POSTS GUARANTEES FINEST QUALITY IN "WARATAH" GALVANISED FENCING WIRE

MADE BY **RYLAND BROS. (AUSTRALIA) PTY. LTD.,** NEWCASTLE, N.S.W., AUSTRALIA.

much lower than they now are. It must be remembered that in New Zealand the sale of table margarine has been prohibited by law for many years, but it is doubtful if margarine would have made any serious inroads into butter sales.

Butter has been reasonably priced in relation to incomes and the prices of other foods for a generation. In the 1930s and early war years the local price was a reflection of export values, which were low, and since 1943 there has been a Government subsidy on butter for local consumption. The price has varied between 1s. 6d. and 2s. per pound and the subsidy has made up the difference between the guaranteed price for butter and the fixed local price.



Butter is the principal fat consumed in New Zealand. Statistics for the FAO Food Balance Sheets show that in terms of calorie intake from fats butter represents 88 per cent and that it makes up 12 per cent of total calorie intake.

Butter was rationed from October 1943 until May 1950 to provide maximum supplies for the United Kingdom during the period of acute food shortage during and after the war. This accounts for the sharp increase in consumption after 1950. Consumption per head continues to rise, probably due to increasing use of butter in cooking.

New Zealand's policy of continuing to subsidise local butter sales is in marked contrast to that of many other countries. In these high domestic prices have resulted in reduced consumption and consequent flooding of the one free market for butter in the world, the United Kingdom.

TABLE 3—PRODUCTION, EXPORTS, AND CONSUMPTION OF CHEESE

Year	Production	Exports	Consumption Total	Consumption Per head	Consumption as percentage of Production	Consumption as percentage of Exports
	000 tons	000 tons	000 tons	lb		
1901-05 (average)	7.3	4.2	3.1	—	42.5	72.1
1921-25 (average)	66.0	63.7	2.3	—	3.5	3.6
1933-34-1937-38 (average) ..	94.2	89.1	3.1	4.5	3.3	3.5
1938-39	85.3	80.2	3.2	4.5	3.8	4.0
1939-40	97.6	92.5	3.5	4.8	3.6	3.8
1940-41	122.4	117.8	3.6	4.9	2.9	3.1
1941-42	157.7	150.1	3.7	5.1	2.4	2.5
1942-43	102.8	97.3	3.7	5.1	3.6	3.8
1943-44	92.1	85.4	4.2	5.7	4.6	4.9
1944-45	103.7	96.5	5.0	6.8	4.8	5.2
1945-46	94.5	87.5	4.6	6.0	4.9	5.3
1946-47	91.6	83.5	4.7	5.9	5.1	5.6
1947-48	86.4	80.2	4.9	6.0	5.7	6.1
1948-49	99.4	91.7	5.3	6.4	5.3	5.8
1949-50	105.4	97.8	5.0	5.9	4.7	5.1
1950-51	108.5	101.5	4.9	5.7	4.5	4.8
1951-52	95.4	88.3	4.9	5.6	5.1	5.5
1952-53	107.1	99.9	5.4	5.9	5.0	5.4
1953-54	103.4	95.8	5.3	5.7	5.1	5.5
1954-55	102.2	94.9	5.6	5.9	5.5	5.9
1955-56	96.3	88.6	5.8	6.0	6.0	6.5
1956-57	94.6	86.3	5.9	6.0	6.2	6.9
1957-58	96.5	89.2	6.1	6.0	6.3	6.8

Sources: 1901-05 and 1921-25, Department of Agriculture estimate; 1933-34 to 1956-57, New Zealand Dairy Board's annual reports.

TABLE 4—PRODUCTION, EXPORTS, AND CONSUMPTION OF PROCESSED-MILK PRODUCTS

Year	Total production	Exports	Consumption Total	Consumption Per head	Consumption as percentage of Production	Consumption as percentage of Exports
	000 tons	000 tons	000 tons	lb		
Condensed Milk and Wholemilk Powders						
1944-45	12.9	7.7	*5.2	*7.0	*40	*68
1945-46	14.4	9.2	*5.2	*6.8	*36	*57
1946-47	15.9	12.1	*3.8	*4.8	*24	*31
1947-48	17.4	11.0	*6.4	*7.9	*37	*58
1948-49	20.9	15.6	*5.3	*6.4	*25	*34
1949-50	21.5	15.7	*4.8	*5.7	*22	*31
1950-51	20.7	10.7	6.2	7.2	30	58
1951-52	22.7	17.2	6.1	6.9	27	35
1952-53	28.3	24.6	6.8	7.5	24	28
1953-54	16.9	14.2	5.8	6.3	34	41
1954-55	16.7	9.8	5.7	6.0	34	58
1955-56	14.7	10.3	5.9	6.1	40	57
1956-57	15.5	8.7	6.2	6.3	40	71
1957-58	13.6	7.2	5.8	5.8	43	81
Skim Milk and Buttermilk Powder						
1944-45	10.2	7.6	*2.6	*3.5	*25	*36
1945-46	9.3	7.9	*1.4	*1.8	*15	*18
1946-47	12.7	11.5	*1.2	*1.5	*9	*10
1947-48	13.5	12.4	*1.1	*1.4	*8	*9
1948-49	18.2	16.3	*1.9	*2.3	*10	*12
1949-50	24.2	21.5	*2.7	*3.2	*11	*13
1950-51	34.1	31.2	2.6	3.1	8	8
1951-52	38.9	35.8	2.9	3.3	7	8
1952-53	44.1	40.8	3.1	3.4	7	8
1953-54	46.0	41.3	4.7	5.0	10	11
1954-55	40.9	33.1	5.9	6.2	14	18
1955-56	47.8	41.9	6.2	6.4	13	15
1956-57	64.7	57.7	6.5	6.7	10	11
1957-58	61.9	48.6	7.0	6.9	11	14

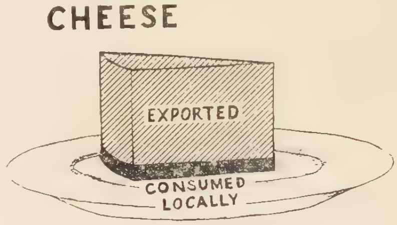
*Calculated from difference between production and export

Source: New Zealand Dairy Board's annual reports.

Cheese

Statistics of cheese consumption are shown in Table 3. All New Zealand's cheese is factory made. All but a small percentage of total output is cheddar, though in recent years there has been some development in the manufacture of the more expensive, fancy cheeses, particularly blue vein. Fancy cheeses are unlikely to replace cheddar to any extent, principally because of limited market opportunities. Total annual output is about 80,000 to 90,000 tons.

Consumption of cheese in New Zealand has never been high, mainly because of the high meat consumption (237 lb per head in 1956-57).



FAO Food Balance Sheets show that total daily intake of animal protein is 70.9 grams, which is very high. Of this 36.5 gm is from meat and only 1.6 gm from cheese.

A campaign to increase the consumption of cheese locally appears justified. Not only would greater use of cheese benefit the dairy industry, but it would improve nutrition, because cheese has a high food value.

Processed Milk

Production and disposal of the major processed-milk products is shown in Table 4, in which attention has been confined to condensed milk and whole and skim milk powders, as these are the main products used for human consumption. Hence products used mainly for stock food or industrial purposes, such as sugar of milk, casein, and buttermilk powder, have been omitted, though considerable quantities are manufactured.

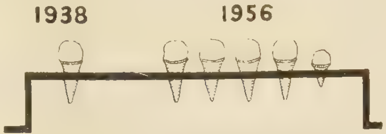
As would be expected with high milk and butter consumption, the amount of processed-milk products sold locally is fairly small. Milk powders are used mainly in the manufacture of baby foods, but unfortunately separate statistics of the output of these are not available.

Principal Products

The principal processed-milk product is skim milk powder, the bulk of which is exported. Processed-milk products will undoubtedly feature much more prominently in the improvement in the diet of the peoples of underdeveloped countries. This is particularly true of the non-fat products, which emphasises the necessity of maintaining butter prices at a reasonable level. Only by doing this will it be economic to produce the non-fat milk solids which the world so badly needs.

Ice Cream

Ice cream consumption in New Zealand, which is shown in Table 5, has increased almost five-fold since before the war and is still rising. Per-capita consumption was 0.4 gallon before the war and by 1956 has risen to 1.9 gallons. The use of vegetable oils in ice cream manufacture is prohibited in New Zealand and ice cream must contain at least 10 per cent of fat, much more than is common elsewhere. Butter used in ice cream manufacture does not qualify for the consumer subsidy.



ICE CREAM CONSUMPTION PER HEAD

TABLE 5—PRODUCTION AND CONSUMPTION OF ICE CREAM

Year	Production	Per capita consumption
	000 gals	gals
Pre-war	—	0.4
1944-45	1,972	1.2
1945-46	2,401	1.4
1946-47	2,554	1.4
1947-48	2,714	1.5
*1948-49	—	†1.5
1949-50	3,063	1.6
1950-51	3,249	1.7
1951-52	3,077	1.6
1952-53	3,264	1.6
1953-54	3,571	1.7
1954-55	3,943	1.9
1955-56	3,995	1.9
1956-57	4,238	1.9
1957-58	4,129	1.8

* Production statistics not collected.

† Estimated.

Source: Industrial production statistics of New Zealand and "Monthly Abstract of Statistics".

Assistant Fields Superintendent at Christchurch

MR W. V. HADFIELD, Farm Advisory Officer, Department of Agriculture, Timaru, has been appointed Assistant Fields Superintendent of the Department at Christchurch. He succeeds Mr W. R. Lobb, who was recently appointed Superintendent of the Department's Winchmore Irrigation Research Station.

Mr Hadfield joined the Department as Assistant Instructor in Agriculture at Timaru in 1942. During 1948 he was stationed in Japan with J-Force as lecturer in Agriculture.

Liaison Officer in U.K.

From 1949 to 1952 Mr Hadfield was Agricultural Liaison Officer in the New Zealand High Commissioner's Office in London. On his return he was appointed Agronomist at Christchurch, but he subsequently transferred to Timaru.

Mr Hadfield has recently returned to New Zealand after two months in Japan assisting the Japanese Government in the development of grassland projects on the islands of Honshu and Hokkaido. Mr Hadfield's assignment followed a Japanese request for expert help to the Food and Agriculture Organization of the United Nations.

Mr Hadfield.

Looking after Your Milking Machine

UNDOUBTEDLY one of the most important contributions to the continual expansion of New Zealand's high-producing dairy industry has been the increasing efficiency of the milking machine.

Though this improvement in machines has generally benefited dairy producers, some farmers undoubtedly do not get the best out of their machines and unfortunately other farmers are using machines that adversely affect the production from otherwise well managed farms.

The Department of Agriculture, which has long carried out research into milking machine improvement at its Ruakura Animal Research Station, has issued a new bulletin, "Machine Milking of Dairy Cows", that should be a useful handbook for quick reference in the milking shed.

Prepared by two officers of the Research Station, the bulletin, No. 260 in the Department's series, begins with a description of the best milking procedure and lists the faults which can adversely affect production. This section on milking practice concludes with a discussion on the best types of milking sheds.

Part 2 of the bulletin contains a detailed description of the parts of the milking machine including the numerous different designs of these parts and the advantages and faults peculiar to them. Very detailed illustrations aid understanding of the text, which deals with vacuum pumps, vacuum tanks, releasers, the milk line, pulsator systems, vacuum relief valves, claw pieces, and teat cups.

The bulletin concludes with short sections on cleaning the milking machine and care of rubberware.

This publication should certainly aid farmers to achieve more than the minimum requirements mentioned and can be considered as a handy printed supplement to the Department's Farm Dairy Instruction Service, as it sets out the essentials of a good milking method, including the cow's part in it, the characteristics of an efficient machine, and the maintenance required to keep it in good running order.

The bulletin can be obtained for 2s. a copy at all main offices of the Department.

◆

CHANGE OF ADDRESS OF "JOURNAL" SUBSCRIBERS

To ensure continuity of delivery of issues of "The New Zealand Journal of Agriculture", subscribers are required to give four weeks' notice of change of address. The old address (preferably) an address label clipped from a recent "Journal" wrapper) and the new address should be sent to the nearest office of the Department of Agriculture. This notification should be made in addition to any given to the Post and Telegraph Department.

◆

Control of Onion White Rot by Seed Pelleting

ONION white rot, caused by the fungus *Sclerotium cepivorum*, has been prevalent in the Christchurch district for the past 25 to 30 years. It is not known how the disease first arrived in New Zealand, but the first recorded occurrence of it was at Halswell. From there it soon spread to Marshland, the main onion growing area of the Christchurch district, where it became firmly established and of increasing severity. Though onion bulbs infected with white rot must have been sent to most parts of New Zealand over the past 25 years, this disease has not become important in any other area where onions are grown commercially.

By J. D. ALLEN and H. C. SMITH, Mycologists, Department of Scientific and Industrial Research, Lincoln, and L. C. HURNDELL, Horticultural Instructor, Department of Agriculture, Christchurch

THE continued and steady increase in severity of white rot disease at Marshland has occurred chiefly because of the difficulty of carrying out general hygiene practices. High labour costs, too, have deterred growers from clearing their ground of infected bulbs after harvest, with the result that these are scattered and buried in the soil during subsequent cultivation.

The spread of white rot through the Marshland district has been increasingly rapid during recent years because of the increasing mechanisation of cultivation. The movement of infected cultivation equipment has probably been responsible for the infection of most areas in the district.

A number of domestic gardens in and round Christchurch are infected with the disease, the original source of which could have been infected bulbs or bulb residues placed on the compost heap or the garden.

The annual loss of onion crops in the Marshland area varies in severity with the weather. In a season of long, cool, moist periods infection can be far worse than in a season where very wet or very dry conditions prevail.

White rot is the most serious disease of onions in Canterbury and appears to be most severe on the sandy peat soils rather than on silty loams. It is also a major problem in many countries throughout the world where onions are grown, being particularly serious in England, Europe, and parts of Australia.

Symptoms of Disease

The white rot fungus is a soil-inhabiting organism which does not produce spores of any kind but survives in the soil in the form of minute black sclerotia or resting bodies. The disease, which can be found on leeks, garlic, and shallots as well as on onions, attacks its hosts during active growth and is not known as a storage trouble in New Zealand, though it has been recorded as such overseas.

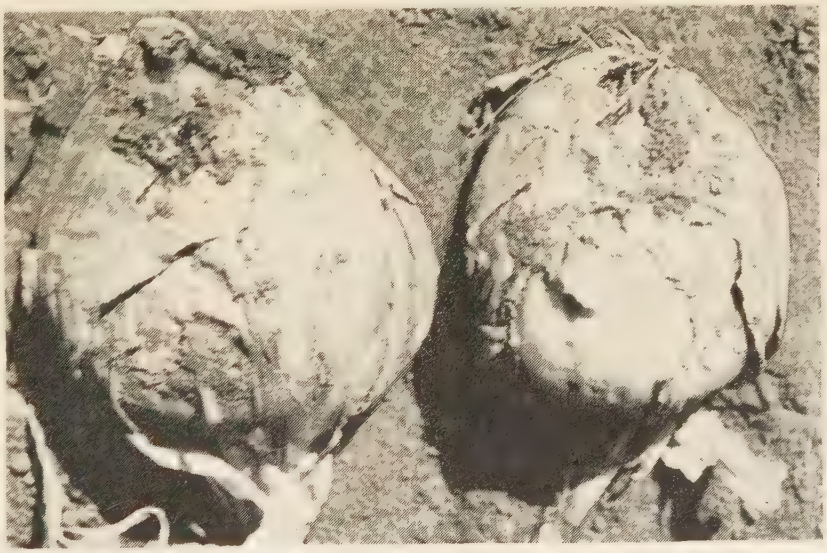
The earliest symptom (which first appears on scattered plants throughout the crop) is a yellowing of the older leaves or, in severe cases, complete wilting of the plant. White rot is a root invading disease. When affected plants are pulled the roots are seen to be rotted and the base of the bulb covered with a white fungous growth (see illustration). If such plants are left in the ground, hundreds of sclerotia develop and remain in the soil when the plants eventually rot away.

White rot disease will not develop when soil temperatures are above 68 degrees F. It is most prevalent at medium soil moistures, but may attack at the lowest soil moisture that will support plant growth. If climatic and soil conditions are right, infection of the bulb can take place at any time during the growing season. Early infections almost invariably lead to the death of the plant, while very late infections are often difficult to detect. The progress of the disease depends to such an extent on climatic conditions, however, that even late infections can cause complete rotting of the bulbs.

Control of white rot presents some difficulty, because no variety of onion is immune to the disease. The resting bodies of the fungus can remain in the soil for eight to 10 years in the absence of a susceptible crop, so it is impossible for the average commercial grower to rid his ground of the disease by rotational practices. Soil application of fungicides has been tried in the past, but the cost can be prohibitive and control is uncertain, though in England the application of calomel dust in the drill rows was found to be helpful. Seed pelleting with calomel has also been recommended in England, but this method was not found to be successful under Australian conditions. Recent trials carried out jointly by Plant Diseases Division, Department of Scientific and Industrial Research, and the Horticulture Division, Department of Agriculture, have shown that pelleting onion seed with calomel (mercurous chloride) gives worthwhile control of white rot.

Investigations into Control

In 1953 a preliminary glasshouse trial testing calomel and the soil fumigants



[*Department of Scientific and Industrial Research*

Onion bulbs that have been attacked by onion white rot.

TARTAN

Topics

P.10

TARTAN DIELDRIN SHEEP SPRAY CONCENTRATE

This concentrate solution, containing 25% Dieldrin, has been formulated for use in all non-return or partial return, walk-through spray races. Used at the various rates recommended control of Keds and Lice and protection from Blowfly Strike can be obtained.

MIXING: Add quantities stated direct to water container, stir thoroughly.

DOSAGES: Three alternatives as follows:

1. Control of KEDS and LICE within three months of shearing use:
   - (a) UNIT CAN PACK: 1 can to 40 gallons of water.
   - (b) 1 GALLON PACK: 25½ fluid ounces to 40 gallons or 1 gallon to 250 gallons. This gives 0.1% Dieldrin in the spray.
2. Control of KEDS and LICE and protection against BLOWFLY STRIKE within three months of shearing use:
   - (a) UNIT CAN PACK: 2 cans to 40 gallons of water.
   - (b) 1 GALLON PACK: 51 fluid ounces to 40 gallons or 1 gallon to 125 gallons. This gives 0.2% Dieldrin in the spray.
3. Control of KEDS and LICE and protection against BLOWFLY STRIKE LATER than three months of shearing OR where BLOWFLY STRIKE is severe, use:
   - (a) UNIT CAN PACK: 3 cans to 40 gallons of water.
   - (b) 1 GALLON PACK: 77 fluid ounces to 40 gallons or 1 gallon to 83 gallons. This gives 0.3% Dieldrin in the spray.

TOPPING UP: Keep adding the concentrate at rates recommended as water is used. No further replenishment is necessary.

GENERAL DIRECTIONS: Dosage rates given are based on a spray output of 4 gallons per minute. Should delivery rate of a spray race vary substantially from this figure consult Bulletin G.1 for alteration in dosage ratio required.

TOXICITY: Precautions listed on labels should be followed.

PACK: Unit cans, 6 cans per case (case = 153.6 fluid ozs.) 1 gallon tins, 4 tins per case (case = 4 gallons).

there's nothing finer!

TARTAN

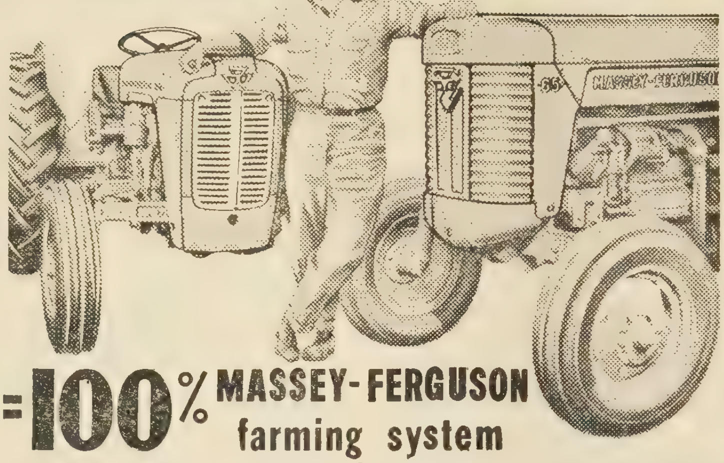
AGRICULTURAL CHEMICALS

North Island Distributors:
Summit Products Ltd., Palmerston North.
South Island Distributors:
A. S. Paterson & Co. Ltd.,
Blenheim, Christchurch, Dunedin.

FARM CHEMICALS COMPANY FCC NELSON

F.C.22

35 + 65



= 100% MASSEY-FERGUSON farming system

The two most copied farm tractors, the highly successful Massey-Ferguson '35' and '65', both with the tried and proven Ferguson System advantages.

M-F '35' diesel and petrol, M-F '65' diesel — singly or teamed together they give you flexibility, efficiency, and economy of working that keeps Massey-Ferguson THE LEADING FARMING SYSTEM IN THE WORLD.

BE WISE — STANDARDISE WITH MASSEY-FERGUSON

Sole N.Z. Distributors: C. B. Norwood Ltd., Box 298, Wellington.
Licensed Motor Vehicle Dealers.

HYDATID -FREE !

TUX

Reg Trade Mark

the **"Dog Tucker" BISCUITS**

Feed your dog TUX "Dog Tucker" Biscuits containing concentrated Wheatmeal, Meat-meal, Liver-meal, Bone-meal, Milk, Oils, Fats, Minerals, Molasses. A balanced, palatable, completely vitamised, hydatid-free dog food.

TUX Biscuits contain all essential ingredients including **LIVER MEAL**

Practical
Farm Packs of
25lb. and 50lb.
bags.
100lb. sacks.

From Stock and Station Agents, Stores or direct from

ELASTRATOR CO. LTD., P.O. Box 226, Blenheim.

formalin, "Shell D-D", and chloropicrin showed that though the fumigants gave some control of white rot, almost twice as many plants survived in calomel-dusted soil.

In the 1954 season the first of a series of field trials was laid down at Marshland. Six different fungicidal dusts were applied to the soil either in a single dose at sowing or in three applications—at sowing, in December, and in January respectively. The results of this trial are summarised below:

Treatment	White rot Per cent 1 appl.	 3 appl.	Healthy bulbs Weight (lb) 1 appl.	 3 appl.
Calomel (mercurous chloride)	30	29	55	54
"Agrosan" (organic mercury)	46	33	50	55
"Dithane" Z-78 (zineb)	37	34	49	46
"Phygon" (dichlone)	40	44	48	42
"Thirodust" (thiram)	46	32	43	41
"Cuprocide" (cuprous oxide)	42	42	37	44
Check (no treatment)	45	42	46	50

The following year calomel, zineb, thiram, and pentachloronitrobenzene ("Brassicol" and "Botrilex") were tested as dusts and sprays applied to the soil in three and six applications throughout the season. In addition calomel-pelleted seed was tested for the first time. Unfortunately the weather was exceptionally dry and very little white rot developed in the trial areas. As a result no treatment differences in disease control could be detected, though it was noted that pentachloronitrobenzene had depressed germination at all rates of application.

For the 1956-57 trials it was decided to concentrate on calomel. Seed pelleting at three different rates was tested in addition to soil application of calomel at the rate of 1 oz per 95 yd of drill.

1956-57 TRIAL

Treatment	White rot No. bulbs	Yield Weight lb
Calomel 2.8 lb per lb seed	48	104
1.4 lb per lb seed	67	96
0.7 lb per lb seed	56	82
Calomel soil application	28	85
Check (no treatment)	76	84

When applied to the soil in this trial calomel proved injurious to germination. This explains the lack of a yield increase with this treatment in spite of the fact that it appeared to give the best control of white rot. The highest rate of calomel seed pelleting on the other hand resulted in a 24 per cent increase in yield.

Before recommending this treatment for white rot control it was decided to test it for at least one more year to determine the most economic rate of application. In the 1957-58 season therefore three trials were sown, seed pelleted with calomel being used at 4 lb per pound of seed and 2 lb per pound; in the third trial untreated seed was used.

Unfortunately there was a delay of three weeks between pelleting and sowing, and this resulted in a very poor strike of treated seed, particularly that pelleted at the 4 lb rate. All the plots sown at the 4 lb rate, and some of those at the 2 lb rate, were oversown with untreated seed. The calomel already in the soil appeared to give some control of early white rot infection, but the final analysis of the trial results showed no treatment differences in respect of white rot control or yield.

As it was obviously risky to use rates as high as 4 lb per pound, last season's trials tested calomel pelleting at 1½ lb per pound and 2 lb per pound of seed. Soil conditions throughout the season were abnormally hot and dry, and this resulted in much less white rot than usual. In addition germination was very slow and any possible toxic effect of the calomel on emergence was fully tested. Germination was impaired slightly, but this did not prevent a higher yield of onions from the treated plots. As the table below shows, this yield increase was accounted for not by an increase in the number of bulbs, but by an increase in the average weight of bulb harvested. The elimination of white rot infections not obvious to the naked eye probably accounts for this.

1958-59 TRIAL

Treatment	Germination per cent of check	No. bulbs per cent of check	Average weight oz	Total weight lb	White rot per cent
Calomel 1½ lb per lb	83	91	4.3	159	1.3
Calomel 2 lb per lb	72	77	4.6	147	1.9
Check	100	100	3.3	134	7.1

Under more normal climatic conditions the incidence of white rot would be greater, while the slight reduction in germination shown by the treated seed in this trial would probably not occur. The value of calomel as a control measure is therefore likely to be even greater than the trial figures suggest. Nevertheless the results show that by pelleting with calomel at 1½ lb per pound of seed a yield increase of 19 per cent was obtained last season.

Recommendations

The results of the trials described above show that pelleting onion seed with calomel gives worthwhile control of white rot and that at rates under 2 lb per pound of seed it will not seriously impair germination. This confirms earlier work in England, where calomel pelleting at 2/3 lb per pound of seed is recommended for salad onions, and the same treatment at 1 lb per pound for bulb onions. It is unfortunate that thiram (for example, "Fernasan") gives no control of white rot and that calomel gives no control of smut. To protect the crop against both diseases it is therefore necessary to pellet the seed first with thiram and then to give it an additional coating of calomel. To do this satisfactorily it is absolutely necessary to use a sticker, methyl cellulose (for example, "Cellophas B", medium viscosity) being the best one to use. This is a relatively cheap material to use.

The recommended procedure for pelleting 5 lb of seed is as follows:

1. Make a 5 per cent solution of "Cellophas B" by slowly adding ½ oz of the powder to ¼ pint of warm water. To avoid the formation of lumps, continuous stirring is necessary.
2. Place the seed in a suitable container (a plastic bucket is ideal) and pour on a small quantity of "Cellophas B" solution. Stir vigorously to spread a sticky coating over each seed.
3. Weigh out 2½ lb of 50 per cent thiram (for example, "Fernasan") and add a small quantity to the seed. Stir until all the powder coats the seed. Add more "Cellophas B" and then more thiram until all the fungicide is used and the seeds are separate and evenly coated.
4. When the seed is dry repeat the process described in 2 and 3 above, but use 5 to 7½ lb of calomel in place of thiram.

Care should be taken that the correct amount of calomel is used, as rates much above 1½ lb per pound may seriously impair germination. As an additional precaution seed should be sown as soon as possible after treatment. Double-pelleted seed is naturally a little larger than usual and growers will find it desirable to open the seed drill to give the usual rate of sowing.

References

"White Rot of Onions and Related Crops", Advisory Leaflet No. 62, Ministry of Agriculture and Fisheries, Great Britain, 1949.

J. R. Booer, "Further Experiments on the Control of White Rot (*Sclerotium cepivorum*) in Onions, Shallots, and Leeks". Annals of Applied Biology, vol. 33, No. 4, pp. 413-419, 1946.

H. E. Croxall, R. W. Sidwell, and J. E. E. Jenkins, "White Rot (*Sclerotium cepivorum*) of Onions in Worcestershire with Special Reference to Control by Seed Treatment with Calomel", Annals of Applied Biology, vol. 40, No. 1, pp. 166-175, 1953.

D. E. Harrison, "White Rot of Onions in Victoria", Journal of Department of Agriculture, Victoria, vol. 52, No. 11, pp. 510-520, 1954.

Acknowledgment

Help by Messrs K. Harris and J. Stewart of Marshland, on whose properties the field trials were conducted, is acknowledged.

1

2

Efficient Feeding out of Chou Moellier

THOUGH chou moellier will produce a good bulk of highly nutritious fodder when grown under suitable conditions, an extremely high percentage of the crop is often wasted when it is being fed off in situ by cattle or sheep during winter. Cutting and feeding out the chou moellier on grass paddocks can reduce losses to a minimum and in this article the methods practised by Mr H. Love, a town milk supply farmer of Willowbridge, South Canterbury, are described.

THE excessive waste with break feeding of chou moellier, particularly good crops, are well known to most farmers. From observations made in the Waimate district alone over a number of years losses estimated to be half of the total yield are not uncommon. Mr Love, with the high-yielding crops which he grew on his 82-acre farm, some years ago faced this problem.

He estimated that about 8 acres of good chou moellier should yield sufficient supplementary feed for up to 50 milking cows for the 5 months between mid April and mid September. However, owing to at least 50 per cent waste with normal break feeding, his cows were short of feed in late winter and early spring. The only alternatives were to increase the acreage of chou moellier to offset waste or to try to reduce it during feeding. Because of limited acreage, the latter course was decided on.

The first method tried was line feeding of the chou moellier. A 4 ft 6 in. strip was mown each day and an electric fence erected on the outside of the cut strip so that the cows had to reach under the wire for the fodder. By this means losses were reduced to about 25 per cent of total yield. However, poaching of the soil was very severe, owing to the high concentration of stock on a relatively small area, and a lot of extra time had to be spent at milking in washing muddy udders and teats.

The carting of the mown chou moellier on a buckrake to a grass paddock was next tried. Though it was a rather slow job, waste was reduced to about 1 per cent of total yield. With more mechanical equipment to speed up the job, this is the practice employed at present.

Technique

Feeding out on the farm is confined to two days a week. On Mondays enough chou moellier is carted out for three days' feeding, while on Thursdays four days' feeding is handled.

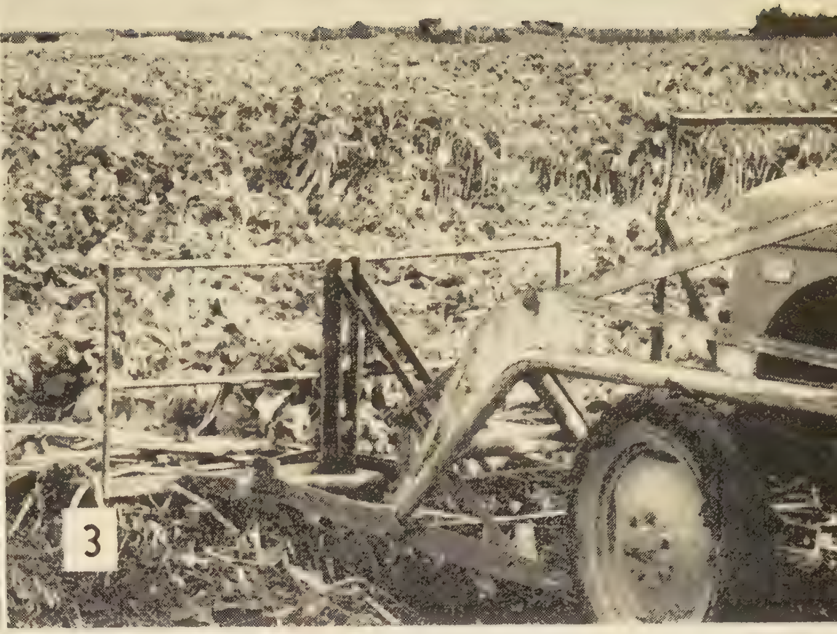
A converted horse mower driven by the tractor power take-off is used for cutting the crop. Because of the ease with which it can be detached from the tractor it is considered more suitable than the normally mounted mower. A wheel-driven horse mower was found to be unsatisfactory because it had to be driven too fast to cut efficiently.

The cut chou moellier is loaded on to a trailer with a steel tined front-end loader. Loading of an estimated 25 cwt of fodder for day feeding takes about ¼ hour, and 15 cwt for night feeding about 10 minutes. Unloading of the cut material in various paddocks takes about ¼ hour for each load. Feeding out sufficient fodder for four days usually takes two men about three hours.

Equipment

Though the provision of suitable equipment for the feeding out of chou moellier by this method entails a slightly increased capital outlay for the average dairy farm, Mr Love considers that this is more than offset by the many other uses to which equipment can be put. For instance, all the hay on the farm is now stacked with the front-end loader and a sweep. An adapted muck bucket attached to the front-end loader is used for removing the hay from the stack and the steel-tined sweep used for loading the chou moellier is very efficient for the sweeping of gorse hedge trimmings.

Two tractors, one of which was purchased by Mr Love on the sale of his hay baler, are used for cutting and feeding out chou moellier, but he considers that it can be done quite satisfactorily with one.



to Dairy Cows

By J. L. SYMONS,
Fields Instructor,
Department of Agriculture,
Waimate

1—The horse mower converted to power take-off for £17. 2—The mowing of sufficient chou moellier for three or four days' feeding takes about ½ hour. 3—The mown chou moellier is picked up with the front-end loader by sweeping across the rows. 4—About 2 to 3 cwt is lifted on to the trailer with each sweep load.

Advantages of Method

Reduction of the waste of feed is the primary object of this system of feeding, but it has several other important advantages on a dairy farm.

Firstly, with the complete removal of all the stems of chou moellier and freedom from poaching which occurs when the crop is grazed, subsequent cultivation of the chou moellier area for a following crop or new grass can be considerably reduced. In fact ploughing of the paddock can begin as soon as a reasonable area is cleared and can be completed immediately after the final break is cut.

Secondly, an adequate ration of clean fodder is made available to the cows immediately after milking. Even though it is fed out three or four days before it is required, there is very little if any deterioration in its feeding value. This is borne out by the high production of Mr Love's herd during winter.

Thirdly, not only is the time spent on the feeding of cows, often an unpleasant job during winter, reduced to a minimum, but milking times are shortened because teats and udders require little washing.

Sheep Feeding

Sheep could possibly be similarly fed to advantage on many mixed cropping farms which have suitable equipment for feeding out. Not only would excessive waste during feeding be reduced, but one of the main disadvantages of feeding sheep on chou moellier, loss of wool on the stalks, would be overcome.

CAN YOU

AFFORD

THE TIME?

Tracking down diesel faults without proper equipment can cost time *and* money. Call in your nearest C.A.V. Service Agent—he is a highly qualified diesel man with the ability *and* the equipment to deal with any diesel job.

IMPORTANT!

C.A.V. Paper Element Filters should be renewed regularly to reduce fuel injection wear. On older model diesels it is wise to have these filters fitted immediately.

C.A.V.

	Phone
WHANGAREI: Whangarei Engineering Co.	2639
AUCKLAND: Joseph Lucas (N.Z.) Ltd., 75-77 Beach Rd. (3 lines)	34-330
HAMILTON: Joseph Lucas (N.Z.) Ltd., Unity Buildings.	40-840
ROTORUA: Joseph Lucas (N.Z.) Ltd., Amohau Street.	2229
TAURANGA: Joseph Lucas (N.Z.) Ltd., Grey Street.	1010
WHAKATANE: Joseph Lucas (N.Z.) Ltd., Commerce Street.	124
HASTINGS: L. M. Silver & Co. Ltd., 202 Jervois Street.	2043
MASTERTON: Cecil Torr Ltd.	4626
PALMERSTON NORTH: L. M. Silver & Co. Ltd., 79 King Street.	2149
WANGANUI: L. M. Silver & Co. Ltd., 263 Victoria Avenue.	8478
WELLINGTON: L. M. Silver & Co. Ltd., Jervois Quay.	54-555
CHRISTCHURCH: Wooff & Salvesen Ltd., 17-19 Lichfield Street.	60-449
TIMARU: A. M. Duncan, 34 Latter St.	1594
GREYMOUTH: Greymouth Motors Ltd., Guinness Street.	256 and 1080
DUNEDIN: Wooff & Salvesen (Dunedin) Ltd., 260 Cumberland Street.	13-642
INVERCARGILL: Hugh Stubbs Ltd., 57 Leet Street.	133

Proven in actual farm practice

A COMPLETE FOOD FOR WORKING DOGS

Thousands of working dogs throughout New Zealand are now fed exclusively on this complete, balanced ration.

TOMOANA

FULL-FEED DOG CRACKERS

Write for free leaflet to W. & R. Fletcher (N.Z.) Ltd., P.O. Box 594, Wellington.

2501

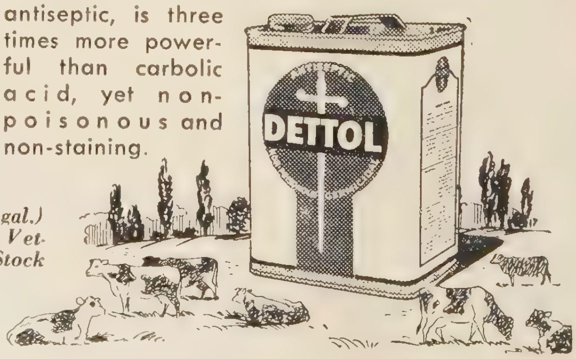
Use safe and reliable

'DETTOL'

THE MODERN ANTISEPTIC

FOR STOCK . .

Dettol, the modern antiseptic, is three times more powerful than carbolic acid, yet non-poisonous and non-staining.



In tins (½ and 1-gal.) from your Chemist, Veterinary Clubs or Stock and Station Agent.

Reckitt & Colman (N.Z.) Ltd., Pharmaceutical Division, Forth Street, DUNEDIN.

Invermay Investigation of

Effects of Hogget Mating on Lifetime Performance of Ewes

THOUGH far from being general on New Zealand farms, the practice of mating ewe lambs has had adherents for many years. The opinions of these farmers are generally favourable but not always precise. Little accurate information on subsequent productive performance seems to be available. Lifetime productivity of ewes which have reared lambs as yearlings is therefore being investigated at the Department of Agriculture's Invermay Research Station. The initial phase of this investigation was discussed in a paper by K. H. C. LEWIS, Scientific Officer, at this year's Invermay Farmers' Conference. This article is an adaptation of that paper.

SO far has hogget mating been thought to be outside accepted management that until recently there has been almost a complete lack of published information on the breeding season of the Romney ewe lamb. Such information has been reviewed by Ch'ang and Raeside (1), who have also made an important contribution.

Available overseas information supports the practice. Careful work with the Hampshire breed in U.S.A. (2) showed that the growth rate over five years was not affected once the difference due to the yearling lactation was recovered at the 4-tooth stage. Two-tooth lambing performance was slightly inferior, but lambing over the remainder of the productive life was comparable. These results and other work (3, 4) indicate that the initial advantage in lamb production from the additional mating is held over the sheep's lifetime.

Further overseas research (5) showed that at 16 months of age hoggets which have reared lambs had lighter carcasses, narrow in both fore and hind quarters, bones of normal length but thinner, and retarded muscle and fat development. However, a year later at the normal 2-tooth weaning there were no apparent differences in carcass conformation. The conclusion was therefore that mating of ewe lambs did not permanently check their growth provided they were adequately fed.

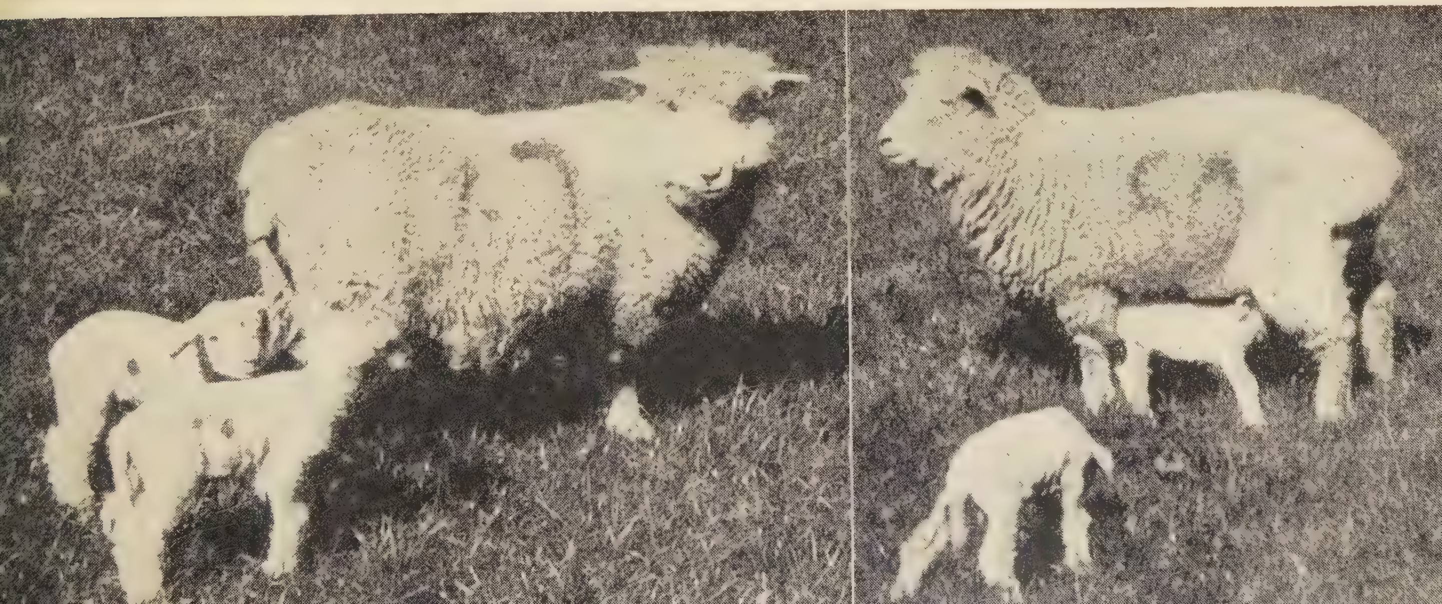
It was on this background and after three seasons of preliminary investigation at the Station that the long-term Invermay experiment was begun.

Stock and Management

From the Station flock about 300 ewe lambs were selected, broadly for adequate development, and divided by restricted randomisation on weight into two groups. One identified group of 100 was returned to the Station hogget flock as a control.

At 83 lb average live weight in early May 1958, these hoggets were considered to be well developed. Though their exact age was not known, they were born in late September or early October and thus were eight to eight and a half months old at the onset of their breeding season.

One raddled Southdown ram was put with 198 ewe hoggets on 16 April to await activity and two further rams were added on 5 May. Matings were recorded once daily from markings. Observation and recording continued until 30 June, 67 days after the first recorded heat period. One ram remained with unmarked ewes until



▼ Two of the ewes in the experiment with their lambs at birth.

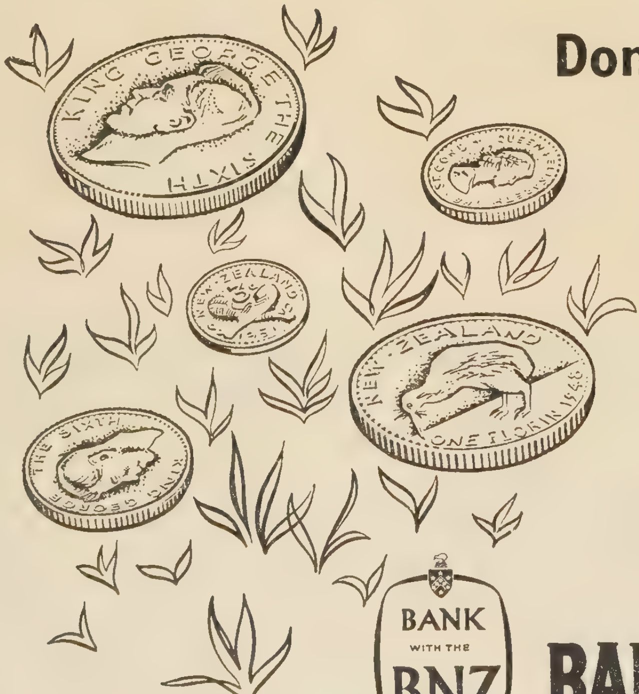
NOW formulated from High Purity Phenothiazine

- LOW VISCOSITY ALLOWING QUICK, EASY DRENCHING
- STIRS EASILY
- ENSURES EVEN DOSING

Dalgety's
SUPERFINE (FINE GRADE)
LIQUID
PHENOTHIAZINE

Obtainable from all Branches of—
Dalgety
AND COMPANY LIMITED
(Incorporated in England)

Don't let money grow idle



Idle funds are no use to anyone. But put to work in Bank of New Zealand Interest Bearing Deposits they can give you a return as high as 3½%.
If you have a commitment falling due several months ahead, safeguard yourself by putting the funds in Interest Bearing Deposits. The interest can be credited to your account or paid in cash, and at the end of the term the B.N.Z. will pay the principal into your account. This is the ideal way of guaranteeing payment while still receiving interest on your money.
Why not find out more about Interest Bearing Deposits? Discuss it at any branch or agency of the B.N.Z. You will be under no obligation.

BANK
WITH THE
BNZ

BANK OF NEW ZEALAND
Established 1861.

F2.9

Some of the ewes and lambs in the experiment at tailing.

28 July. Favourable conditions for mating were provided by using paddocks of 3 to 4 acres.

The feeding of the control group followed normal Station practice for ewe hoggets. No attempt was made to flush the mated group, which was carried on grass with hay supplements until early July and then boxed with the Station hoggets until 10 September. The group then went on to grass with a limited oat supplement. No difficulty was experienced in promoting satisfactory development in all experimental animals.

In spring the lambing group was given preferential treatment up to weaning while control animals were less favourably grazed so that they did not become too fat.

RESULTS

Onset and Pattern of Heat

Isolated animals showed heat (which may not have been the onset) on 25 April, but there was then inactivity for 10 days. Moderate but consistent activity started on 3 May and continued throughout that month. Isolated onsets only were recorded after the first week in June, the latest being 29 June. The mean date of onset, 22 May, was comparable to that found by Ch'ang and Raeside (1) in North Island Romney ewe lambs.

As the rams were removed from ewes exhibiting heat at the end of June, the pattern of the return to inactivity is not known. Results showed that earlier onsets favoured conception and that 70 per cent of barren ewes either did not exhibit heat or had but one cycle.

TABLE 1—RELATIONSHIP BETWEEN WEIGHT AT MATING AND HEAT ACTIVITY

	No.	Per cent	Live weight lb	Range lb
Exhibiting heat ..	179	91	83.79	57-95
Pregnant ..	132	67	83.90	—
Not pregnant ..	47	24	83.50	—
Heat absent ..	17	9	78.00	68.94

Table 1 shows body weight at approximate time of onset for various classes of performance. There was a significant difference of 5.8 lb (1 per cent) in live weight between ewes showing and not showing heat. Though there was a definite relationship between live weight at puberty and commencement of heat, the success of consequent matings appeared to be unrelated to live weight. Lambs of weights throughout the entire range of the group exhibited heat.

Lambing

The average lengths of 115 gestation periods ranging from 139 to 152 days were:

	Days
102 single births	145.1
13 twin births	146.0

These were derived from the once-daily recording of matings and births at similar times each day. The mean date of birth was 19 October.

Lambs were weighed and tagged at birth. Congenital abnormalities and mortality were fully recorded, though often the cause of death could not be diagnosed accurately. Whenever possible lambs were fostered on to ewes which lost their lambs to keep them lactating. The flock generally was placid with a strong mothering instinct not greatly inferior to that of mature ewes and rather better than that of 2-tooths.

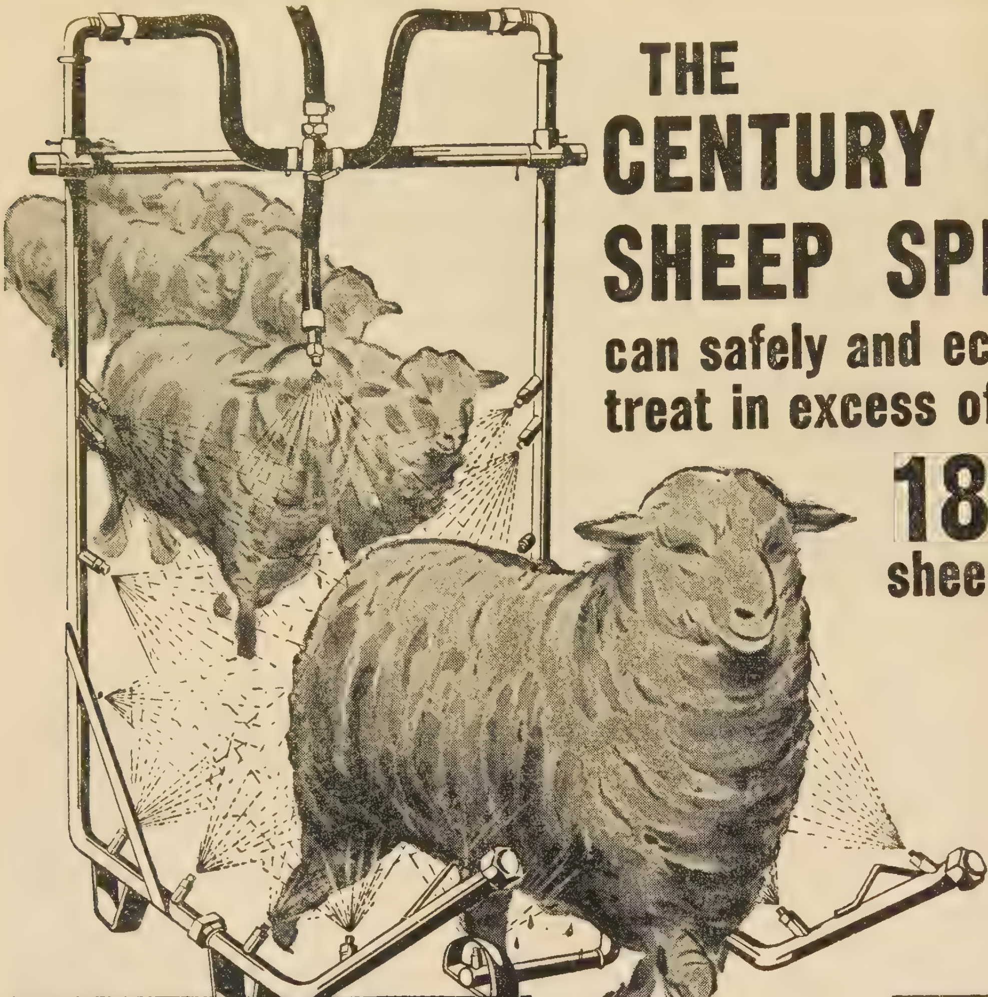
There was a high incidence of abnormal presentations, nine being of the head and one foreleg type. Rectifying these conditions was more difficult than in 2-tooths because of the small pelvic girdles. However, malpresentation was not a major cause of lamb mortality. The few births classified as "assisted" were mainly those in which the vulva was constricted. One ewe had pre-natal bearing trouble and died after producing twins. This was the only ewe lost at lambing. Table 2 shows lambing performance.

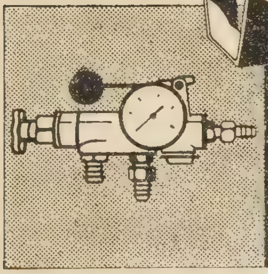
TABLE 2—SUMMARY OF LAMBING PERFORMANCE

Barren		
Exhibiting heat	47	
Heat absent	17	
Total		64
Normal births		100
Abnormal births		
Born alive:		
Assisted	4	
Malpresentations ..	11	
Total		15
Born dead:		
Assisted	1	
Malpresentations .	3	
Premature . .	4	
Normal	9	
Total		17
Total		196

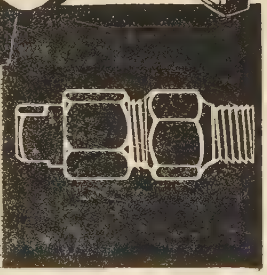
THE CENTURY HOLTON SHEEP SPRAYER

can safely and economically treat in excess of 1800 sheep per hour

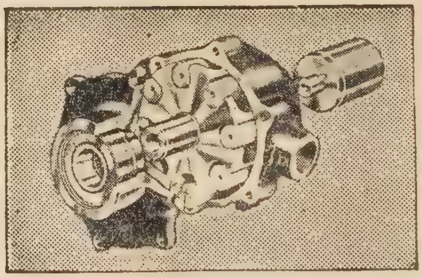




ACCURATE POSITIVE PRESSURE CONTROL UNIT



20 BRASS NOZZLES WITH SET SPRAY PATTERN



HYPRO N7500 HIGH PRESSURE PUMP

THE CENTURY HOLTON Sheep Sprayer high pressure unit operates at 150 lbs. P.S.I. applying 265 gallons per hour through 20 specially designed nozzles. This high pressure ensures maximum coverage for the control of lice, keds and blowfly, and when using Dieldrin and Aldrin in the correct manner, is recognised by the N.Z. Department of Agriculture as complying with the Stock Act 1908 (amended 1947), as a legal method of dipping. The sprayer and pump can fit into the boot of a car. The complete unit can also easily be carried by one man and can be erected in a few minutes.

THE PUMPING UNIT. The sheep sprayer operates with a high pressure Hypro N7500 nylon roller pump at a pressure of 150 lbs. P.S.I. The pump unit may be coupled direct to a tractor power take off, or driven by an independent petrol engine, thus making the unit ideal for field use.

CENTURY

HOLTON SHEEP SPRAYER

DISTRIBUTED BY FRANK M. WINSTONE (MERCHANTS) LTD.
71-79 CUSTOMS STREET, AUCKLAND

JA.8/W/59

Extremes in udder development in ewes being used in the investigation.

Birth Weight

The mean birth weights of single and twin lambs are shown in Table 3.

Earlier experience had consistently shown a mean birth weight of 8 to 8½ lb for Southdown-cross singles, about 1 lb lower than the same cross born to 2-tooth ewes. The birth weights of the limited number of twins were relatively high compared with those of singles and might indicate an appreciable reserve in foetal development.

TABLE 3—BIRTH WEIGHT OF LAMBS

	No.	Weight lb		Range lb
Singles:				
Male ..	63	8.82	8.29	4.8-12.6
Female ..	50	7.61		
Twins:				
Male ..	16	7.34	7.12	4.6-9.3
Female ..	10	6.76		

The possibility that where lambing was prolonged late into spring exceptionally good feeding conditions in late pregnancy might result in increased birth weights was not supported by results. No difference was found in the sex-corrected weight of single lambs born before and after 19 October, the mean birth date of all lambs. Nevertheless the contribution of heavier lambs to abnormal births was high.

Of 20 births of lambs weighing 10 lb or more, only 35 per cent were normal, 45 per cent were assisted or malpresentations, and 20 per cent of the lambs were born dead. The frequency of abnormalities in the birth weight range 9 to 9.9 lb was about the same as for all births, 76 per cent of which were normal.

Twin Births

Ewes bearing twins were allowed to rear their lambs except where removal of the lamb was necessary for its survival, but of 14 sets only five were reared intact to weaning. Four sets were broken by death or mothering off at birth and five by deaths after tailing.

In spite of relatively high birth weight and apparent viability at birth, twin births made an excessive contribution to lamb losses; 13 of 28 lambs failed to survive to weaning. The growth rate from birth to weaning (0.283 lb per day) was below that for singles. Though heavier losses and lower live-weight gains are expected with multiple births, it is probably unwise to allow ewe hoggets to rear both twins, particularly where foster mothers can readily be found.

Lamb Losses

Fewer lambs survived to weaning (Table 4) than might be expected with favourable weather and close shepherding. Eighteen per cent of those born died before tailing and 27 per cent before weaning. Four of the 14 deaths after tailing were due to white muscle disease, the influence of which in births and subsequent losses was not clear. Such wastage has not been characteristic of hogget lambing on earlier experience. Nevertheless young stock may prove to be more susceptible to conditions inducing white muscle disease in their progeny, and all the available precautions should be taken.

Lamb Growth to Weaning

Though a warm, dry spring favoured lamb growth, a summer that became progressively drier made feed suitable for fully lactating ewes difficult to find. The mean age at weaning was 89 days, the ages ranging from 52 to 114 days. Thus there was a rather wide range in nutrition and environment. The average gain of 0.394 lb per day for single lambs from birth to weaning was satisfactory, but fell short of results obtained with earlier-born lambs from 2-tooth ewes in a similar environment.

The ewes were obviously able to produce sufficient milk. Though udders were variable in size, they were shapely and teat development was good. There seemed to be a definite relationship between a lamb's growth rate in the early part of lactation and the size of the ewe's udder, but as lactation began at different dates up to 30 days apart, accurate estimation of the relationship may not be possible.

TABLE 4—LAMB LOSSES

		Per cent of ewes mated
Lambs born (inc. prematures)	146	73.7
Lambs born at term	142	71.7
Lambs born alive	129	65.2
Lambs surviving 24 hours ..	124	62.6
Lambs surviving to tailing ..	120	60.6
Lambs surviving to weaning	106	53.5

TABLE 5—WOOL PRODUCTION

	No.	*lb
Heat absent	15	5.69
Exhibiting heat:		
Barren	43	5.93
Lactating	128	5.47
Control	100	5.27

* Unskirted fleece weight

Growth and Development of Hoggets

The mean weight of lactating ewes at weaning (16 January) was 108 lb, some 8½ lb lighter than barren and dry ewes and 6½ lb lighter than controls (similar, unmated hoggets). A precise estimate of the effect of lactation on body weight was not possible in this trial, because both control and barren ewes were fed differently from productive ewes for some part of the year.

In two previous trials lactating hoggets had reached 110 to 115 lb at weaning and had become comparable with non-milking hoggets in body weight and appearance 9 months later. The resilience of young stock to early stress (such as lactation) has been established (6). With good feeding and management the trial ewes are expected to recover condition completely.

Wool Production

All lambs were shorn in April before the start of tupping. Unskirted fleece weight at shearing in November is shown in Table 5.

Animal Diseases Expert for Conference in Manila

DR S. JAMIESON, Chief Advisory Officer (Infectious Diseases Control), Department of Agriculture, will represent New Zealand at the Fourth Joint Food and Agriculture Organization and International Office of Epizootics Far East Meeting on Animal Health in Manila in December.

At the meeting each representative will report on the history of various animal diseases in his country and detail present and proposed measures to combat them. These diseases include rinderpest and foot-and-mouth disease, diseases in young animals, and poultry diseases.

Though many of the diseases listed for discussion have never occurred in New Zealand, they are a constant threat and in view of New Zealand's increasing trade with Asia it is most necessary that we know what steps other countries are taking against them.

On the average ewes had been in milk for 36 days before shearing. The extent to which wool production was affected by pregnancy and lactation is perhaps best represented by the difference between the fleece weight of lactating ewes and barren ewes which showed heat. The latter sheared about ½ lb more. However, the comparison is not straightforward, because the two classes of ewes were separated before and throughout lambing.

CONCLUSIONS

Over 100 lambs have been reared from ewe hoggets. Only overseas reports carry an assurance that breeding from well reared hoggets is not detrimental to the animals' subsequent production. So far the Invermay trials indicate that pregnancy and lactation produce no major stresses. However, though effects on the ewes' development may be expected to disappear before the 4-tooth mating, earlier pregnancy may have important effects on longevity, particularly on the soundness of teeth and udders.

Records accumulated during the lifetime of the experimental flock of ewes which have reared lambs as yearlings will enable relationships to be established between yearling and subsequent breeding performance. Their relative value as aids in selection of hoggets for mating can then be assessed.

At this stage the farmer on the better class of land may choose to tap the productive potential of his hogget flock. A trial mating of a small number of hoggets may be desirable to test the soundness of the step. If lambs exhibiting heat in May have only one or perhaps two cycles before rams are removed to avoid very late lambs, lambing percentages cannot be expected to be more than 50 to 60.

References

1. Ch'ang, T. S., and Raeside, J. I., "A Study of the Breeding Season of Romney Ewe Lambs", "Proceedings of the New Zealand Society of Animal Production", Vol. 17, p. 80 (1957).

2. Spencer, Schott, et al, "Journal of Animal Science", Vol. 1, p. 27 (1942).

3. Bowstead, J. E., "Effect of Breeding Immature Ewes", "Scientific Agriculture", Vol. 10, p. 429 (1930).

4. Briggs, H. M., North Dakota Agricultural Experiment Station Bulletin No. 285, "Some Effects of Breeding Ewe Lambs" (1936).

5. Palsson, H., "Animal Breeding Abstracts", 1955, Vol. 23, p. 53.

6. Coop, I. E., "Effect of High and Low Plane Rearing of Hoggets on Lifetime Productivity", "Proceedings of the New Zealand Society of Animal Production", Vol. 16, p. 31 (1956).

The Home Garden in January

By A. G. KENNELLY,
Horticultural Instructor,
Department of Agriculture,
Dunedin

GROWING vegetables in the home garden has two important advantages for most home owners. One is the saving of money because vegetables can be grown in the home garden very cheaply. The other is the value from a health point of view of being able to harvest fresh vegetables as required from the garden. Home gardeners should make special efforts to have vegetables available when they are likely to be scarce and dear. It is not difficult to have good supplies in the garden in January and most home gardens are well stocked with a variety of vegetables then. The chief work for most home gardeners in January is weed control and the planting out of winter greens such as cabbage, leeks, and winter cauliflower and the sowing of crops for autumn and winter use.

[*Green and Hahn*

Leeks such as this excellent specimen are not difficult to grow if the soil is in good order and the plants are set out in plenty of time to grow unchecked. January is a suitable time for setting out plants.

IN many districts January is the final opportunity for sowing beetroot and carrots to mature before winter. Late sowings of carrots are sometimes less subject to the attack of carrot aphids and the carrot rust fly and are therefore preferred in some districts. In southern districts the situation and autumn weather must be favourable if late crops are to be satisfactory. The seed must be sown without delay in soil that is in good condition and worked to a fine tilth.

The situation should be sunny and open, as these root crops rarely thrive if shaded, even if soil conditions are otherwise perfect. Beetroot and carrots are not difficult to grow, but soil must be friable, moist, and well drained and the plants must be kept free from insect pests. Light, sandy loams are most satisfactory and produce the smoothest and straightest carrots, but all good loams apart from the heavier clay loams can be improved to produce satisfactory crops.

Home gardeners commonly find it difficult to grow carrots and beetroot in the older, sometimes rather light soils that have been worked for many years without having had much organic matter such as compost or farmyard manure applied to them. Trouble is commonest in the smaller garden, where vegetable growing is usually continuous and good crop rotation with adequate use of green manure crops is difficult.

Carrots and beetroot grow well in soils that were heavily dressed with organic manure for the previous crop. The application of heavy dressings of organic manure just before sowing is not advised, though results may be satisfactory if the manure is well rotted and mixed throughout the root area. The incorporation of lumpy masses of fresh or only partly rotted manure is especially to be avoided, as carrots coming in contact with this manure may become forked or distorted.

Varieties

Good varieties of carrots for home garden use include Red Cored Chantenay, Manchester Table, and strains of Strong Top. Sweet Crop is a variety which has attracted a good deal of interest among home gardeners. It is a selection of Holmes Improved developed by the Crop Research Division of the Department of Scientific and Industrial Research. It is smaller than the original Holmes Improved, but retains the same characteristic sweetness. Generally, its colour is poor and it develops objectionable green shoulders, which may protrude up to 2 in. above the soil surface unless the soil is drawn up to the plants.

Detroit Dark Red is one of the most popular varieties of beetroot, but

what is soil conservation?

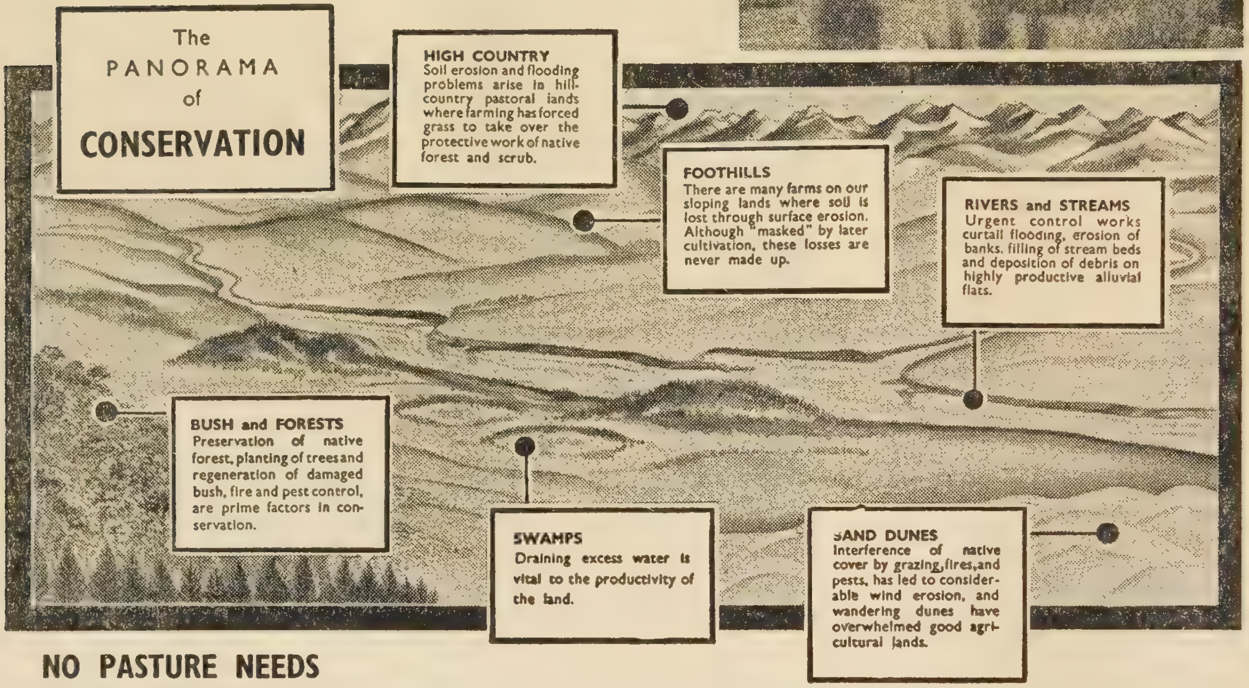
PATTERN FOR PRODUCTION

No. 1 of a series.

From our farmlands stem the welfare of New Zealand and the wellbeing of New Zealanders. Our economic stability depends on the stability of our soil...yet thousands of highly productive acres are endangered by erosion.

The land we have we must hold!

CONSERVATION IS THE SOLUTION



The PANORAMA of CONSERVATION

HIGH COUNTRY
Soil erosion and flooding problems arise in hill-country pastoral lands where farming has forced grass to take over the protective work of native forest and scrub.

FOOTHILLS
There are many farms on our sloping lands where soil is lost through surface erosion. Although "masked" by later cultivation, these losses are never made up.

RIVERS and STREAMS
Urgent control works curtail flooding, erosion of banks, filling of stream beds and deposition of debris on highly productive alluvial flats.

BUSH and FORESTS
Preservation of native forest, planting of trees and regeneration of damaged bush, fire and pest control, are prime factors in conservation.

SWAMPS
Draining excess water is vital to the productivity of the land.

SAND DUNES
Interference of native cover by grazing, fires, and pests, has led to considerable wind erosion, and wandering dunes have overwhelmed good agricultural lands.

NO PASTURE NEEDS TO BE UNPRODUCTIVE

To meet every conservation requirement there is a proven programme available.

Bulletins Available

"Giving Wings to Soil Conservation" No. 11.
"Conservation Farming for Hill Country" No. 15.

Pioneer investigations by catchment boards and Government Departments have resulted in the development of many conservation methods. Advice is free - and subsidy is available for erosion control. Upon application to a catchment board or the Department of Agriculture a farmer can have the land capability of his property assessed and a conservation farming programme prepared and geared to his own resources for a five-year period.

POST THIS COUPON FOR FREE BULLETINS AND ADVICE to:

THE SOIL CONSERVATION &
RIVERS CONTROL COUNCIL,
P.O. BOX 8024, WELLINGTON.

Please forward, free of charge, the following Conservation Bulletins. (No.s) ....

Would you like a field officer to call and discuss your conservation problems? YES/NO

NAME ____________________

ADDRESS ____________________

____

SOIL
CONSERVATION
OFFERS
PLANNED
ECONOMY

THE SOIL CONSERVATION AND RIVERS CONTROL COUNCIL.

SOWING, PLANTING, AND OTHER WORK

Routine Work

Set out early and late maturing varieties of Savoy or winter cabbage, winter cauliflower or broccoli (several varieties each of a different maturity period to ensure succession), borecole or kale, brussels sprouts, leeks, round or summer cabbage, cauliflower varieties maturing in three, four, or five months for succession.

Sow a cover crop on any ground not to be used for cropping for some time.

Lift kumara runners to prevent them rooting.

Remove side shoots of tomatoes and also give support to tall and intermediate varieties.

Keep the hoe sharp and hoe out weeds when they are small. Hoeing is most effective in warm, dry weather.

Build a tidy compost heap with unwanted vegetable refuse. Burn only woody material or material affected with readily spread pests and diseases.

Keep potatoes earthed up to prevent greening of the tubers and to protect the tubers against infestation with potato tuber moth.

Successional Sowings

Dwarf beans, beetroot, carrots, kohl rabi, lettuce, mustard greens, mustard and cress, peas, radishes, silver and perpetual spinach beet, spring onions, tampala, turnips.

Other Sowings if Not Yet Done

Parsnips (now late for sowing, except in districts having a long, mild autumn), swede turnip.

Spraying

Spray tomatoes and vegetables infested with caterpillars, vegetable weevils, green vegetable bugs, and other active pests with DDT or with lindane and DDT mixed if aphids (grey aphids, green fly) are also present.

Spray potatoes and tomatoes with copper sprays (bordeaux or copper oxychloride) or certified substitute where conditions tend to be warm and humid and potato blight is present or likely to be troublesome.

Spray beans and other crops infested with red spider mite with summer oil and nicotine sulphate or with a certified miticide (the mites are tiny, greenish, yellowish, or reddish) and feed on the undersides of the leaves, denuding them of their green colouring matter.

Spray onions and other crops infested with thrips with DDT or lindane.

Spray celery where necessary against leaf diseases with captan or zineb or copper sprays.

Under Glass

Where necessary spray tomatoes affected with leaf mould fungus at 10-day intervals with salicylanilide or zineb. Thiram is partiularly effective against the common form of stem rot (*Botrytis*). Heavy applications of captan or maneb usually give protection against the less common form of stem rot (*Didymella*).

Early Wonder, which is a heavy yielder and matures eight or nine days before Detroit Dark Red grown under similar conditions, should be more suitable for a late sowing, particularly where the season for it to develop is limited. Early Wonder is semi-globe shaped with a smooth skin, good flesh texture, a fine taproot, and a strong top.

Soil Preparation

Soil preparation for the seedbed should be thorough. Lumpy soil should be pulverised to a fine tilth.

Results are likely to be better on most soils if mineral fertiliser is used to supplement the organic manure in the soil. A complete fertiliser—one made up of nitrogen, phosphate, and potash—is likely to give best results on most soils, but good responses are obtained on many New Zealand soils from superphosphate alone. Superphosphate can be worked in at about 2 to 3 oz to the square yard during the final cultivation.

Carrot seed is rather small and should be sown only ¼ in. deep in rows 12 to 15 in. apart at about 15 to 20 seeds to each running foot of row. On soils that tend to form a crust after rain the soil over the seed should be kept hoed to break the crust and to facilitate the emergence of the tiny seed shoots.

Soil and manurial requirements for beetroot are similar to those for carrots. Seed should be sown ½ in. deep, about 10 to 15 seeds to the running foot, in rows 12 to 15 in. apart. Plants should be thinned to 2 to 3 in. apart as soon as they can be handled.

Celery

Though it is useful for soups and stews, celery is most popular as a salad vegetable. Most home gardeners like to set out plants as early as possible and though plants can be set out earlier where temperatures are high enough, December and January are the preferred months for planting. Later planting is practical only where autumns are mild enough for the completion of growth.

Home gardeners sometimes defer planting until after their summer holidays so as to be able to attend to the plants throughout their growing period, because for good growth celery should have a continuous and fairly high supply of moisture and requires spraying regularly in most districts to keep the plants free from leaf diseases. However, temperatures are of first importance for self-blanching varieties. If they are not high enough during the seedling stage, plants will fail.

Home gardeners usually buy young celery plants from seedsmen or nurserymen, as the seedlings of self-blanching celery need to be raised in consistently higher temperatures than prevail in most districts without the aid of a glasshouse or heated frame. Most varieties of self-blanching celery begin to develop seed stalks if they are subjected for a week or more to temperatures of from 35 to 50 degrees F.

Manures

Though self-blanching celery is more tolerant in the seedling stage of insufficiencies of moisture, nutrients, light, and space than it is of low temperatures, a good deal of skill is needed to grow it well, as it needs a rich soil, ample moisture, and good drainage. Organic manures such as farmyard manure or blood and bone are preferred, but where organic manures are not available in sufficient quantity it is usual to supplement them with mineral fertilisers. Nitrogenous and phosphatic fertilisers are usually applied and give improved growth on most soils. Potash is less often applied, though it is probable that it would improve the quality of celery on many soils.

A complete and balanced fertiliser made up of 2½ parts of sulphate of ammonia, 2½ parts of superphosphate, and 1 part of sulphate of potash applied at about 2 to 4 oz to the square yard according to soil fertility should promote good growth. Manure should be mixed into the top few inches of the soil before the plants are set out; deep placement is not advisable, as the roots of celery remain near the surface.

Soil moisture is as important as soil nutrients in the growing of celery, and to facilitate watering in soils that may dry out plants can be grown in shallow trenches.

Non-self-blanching Types

The types of celery which are not self-blanching are usually considered

all Aphis fall for it!

Yes! All Aphis fall for METASYSTOX, the Systemic insecticide, which spreads throughout the entire plant via the sap stream, making it toxic from within. METASYSTOX is impervious to the action of the wind or rain and it persists in the plant before breaking down into harmless residues. The toxicity of METASYSTOX is similar to Lindane, an insecticide widely used throughout New Zealand. Kill all Aphis on Rape, Turnips, Chou Moellier, Swedes, and all other Brassica Crops.

METASYSTOX®

Metasystox has been officially certified by the Plant Diseases Division for the control of Aphis on Brassicas.

order now from your local stockist!

Technical leaflets available from your stockist or from the sole N.Z. Importers

HENRY H. YORK & CO. PTY. LTD.
(Inc. in N.S.W.)
AUCKLAND · WELLINGTON
CHRISTCHURCH

(R) Registered Trademark

less difficult to grow than the self-blanching types and are considered by many to have a superior flavour and texture. A well grown head of celery should be made up solidly of large, thick-fleshed, succulent leaf stalks, and the characteristic celery flavour should be strongly developed.

Planting in a trench is specially favoured by those who blanch the older, non-self-blanching varieties by moulding the earth up the stems, but it is practicable only where the soil is deep and well drained and does not contain too much organic matter. Non-self-blanching celery is less subject to leaf spot disease than self-blanching kinds.

Cucumbers, Marrows, Melons, and Pumpkins

As long as the soil is not permitted to dry out cucumbers, pumpkins, marrows, melons, and other cucurbits usually require very little attention at this time of year. Once marrows and pumpkins are properly established and good laterals are developing it should not be necessary to pinch back or stop the leading growths unless they are invading a neighbour's garden or ground reserved for another crop. Shoots of trailing varieties can be trained in the desired directions by driving short sticks on either side of the stems at intervals of 1 to 2 ft.

If growing conditions are good and the surface soil is kept moist and is well drained, the trailers of some varieties sometimes root in the soil. This is a desirable feature, because it increases the weight of crop. Pegging encourages rooting and also prevents trailers from being blown about by strong winds.

The fruit of marrows should be cut when young, preferably before the skin hardens to the extent that it cannot be broken easily by the thumb nail; 10 to 12 in. is a good size, as larger marrows usually have less flavour than smaller ones.

Early cutting of the fruit encourages the development of later ones. It is inadvisable to allow fruit to reach full maturity, unless it is intended to grow mammoth specimens or to store fruit for winter. They store quite well and, like pumpkins and squash, which should also be allowed to mature fully if they are to be stored, should be harvested carefully without being subjected to even slight frosts and stored under perfectly dry, frost-free conditions.

Cucumbers are more tender than tomatoes or sweet corn and as the leaves are readily scorched by sun or wind in exposed situations, they should be grown between rows of taller plants, such as peas or sweet corn, which will provide some shelter. The fruits should be harvested before they are fully mature.

Cucurbits often become infested with aphids or green fly. In warm weather aphids multiply rapidly and unless checked they soon damage the plants. Some species of aphids exude a sticky substance on which a sooty mould grows, which makes the plant unsightly. Aphids also cause the leaves to curl and become distorted; the fruit and flowers, too, may become deformed. Frequently aphids transmit virus diseases, which may cause serious reduction in yield or even the death of the plants. Aphids can be controlled by spraying with lindane or nicotine sulphate.

[*Green and Hahn*

Though many home gardeners prefer to plant earlier, celery should do well if sturdy seedlings such as these are set out in January.

Parsnips

Though in southern districts October is the preferred month for sowing parsnips, they will mature from later sowings in districts having a sufficiently long, mild autumn. January sowings are satisfactory in many districts. The greatest value of parsnips lies in their use as a winter vegetable, as they stand well. Provided the soil is well drained, they rarely suffer harm even if left in the ground in the severest winters. Though it is generally said that the quality of parsnips is better after they have been subjected to frost, it is low temperatures, not necessarily frosts, which improve quality.

Parsnips are very sensitive to soil acidity and in most gardens the ground where they are to be sown should be dressed with lime at 3 oz per square yard at least, if a dressing has not been applied during the last year. In high-rainfall areas the rate should be increased.

Like most other taprooted vegetables parsnips should be kept growing steadily if quality and yield are to be good, and a deep, friable, well drained, deeply cultivated soil that is well supplied with humus is best. Parsnips do best in soil in which organic manure has been applied to the preceding crop.

Seed should be sown $\frac{1}{4}$ to $\frac{1}{2}$ in. deep in rows 15 in. apart and the plants thinned to 4 to 8 in. apart, or more if very large specimens are required, as soon as they are established. If the plants are first thinned to only 1 or 2 in. apart, the final thinning can be used in soups or stews.

Popular varieties include Hollow Crown and Ox Heart.

Peas

In many districts January is the latest month for sowing peas which will mature before winter. In the

YOUR HOGGETS, FRED, ARE GOING TO BE ALRIGHT . . .

His name is Fred Mackenzie, Scot by extract, sheep farmer by occupation. You wouldn't call him a 'worrier', not by a long chalk. When you've reared as many lambs as he has, then you know it's work and planning and then still more work that does the trick in the sheep game. Not a worrier, then. But you *could* call him a 'wonderer'. And what sets him wondering more than anything is what happens to all those hoggets of his—as prime as any in the two islands—after they leave his care.

No doubt he's not the only farmer who gives it a thought, but with Fred it has become quite a thing. You see, his brother-in-law Alf is second officer on one of the ships that serves New Zealand and every once in a while, when he happens to be in port, Alf drops in at Fred's home. And that home overlooks the harbour at Napier. That's what sets Fred wondering. He sees them loading all that lamb and he can't help wondering: "Perhaps that's my hoggets they're handling right now" and "I hope they're looking after them properly" and "They'd *better* look after them". He got so worked up about it the other day that he swung round on Alf and scowled, "What the blazes do they do with my hoggets once they get aboard those ships of yours ?"

Alf just grinned. "Worried about your hoggets, are you Fred ? You don't have to, you know—they're in very good hands. But I'll tell you what—next voyage, I'll drop you a line now and again to tell you how your hoggets are getting along".

Well, there you are Fred. A promise is a promise—and we'll publish Alf's reports in our regular monthly advertisements. So keep an eye on this space, Fred, and you'll be able to see just what happens to your hoggets . . .

NEW ZEALAND OVERSEAS SHIPPING LINES

SHAW SAVILL & ALBION CO. LTD · THE NEW ZEALAND SHIPPING CO. LTD · PORT LINE LIMITED · BLUE STAR LINE LIMITED

cooler districts a quick-maturing variety should be chosen and in most southern districts it is advisable to sow early in the month. Peas thrive in cool but not cold conditions, and a moist, deeply cultivated, well drained soil containing adequate humus is best.

Soil preparation should be thorough. The ground should be deeply dug and where necessary organic material such as compost or farmyard manure should be incorporated, preferably some time before sowing, though peas usually do best after a crop that was well manured with organic and inorganic manure.

The addition of superphosphate at 1 to 2 oz per square yard has proved beneficial on many of the heavier soils that have been kept in good condition by adequate manuring with organic material or by the digging in of green crops, but on the lighter soils a complete fertiliser is likely to give better results.

Only moderate fertiliser applications are advised on soils in reasonably good condition. Too-heavy manuring, particularly with nitrogenous organic manures, tends to promote excessive vegetative or straw growth and makes the crops more liable to disease.

Lime is essential on most soils and can be supplied by an annual dressing of 3 to 4 oz of carbonate of lime per square yard.

Seed Sowing

Seed should be sown in V-shaped or broad, flat drills, usually drawn out with the hoe. Drills should be 2 to 3 in. deep, except where conditions are hot and dry, when they should be considerably deeper so that though the seed should not be covered with more than 2 in. of soil, the roots will be well down in the cooler and moister soil of the lower levels. This is very important where conditions are dry or where heavy wind is likely. As the plants grow soil can be drawn up along the row to support them. Dwarf varieties should require no other support.

Protection of newly emerged peas against birds is essential in some districts, though birds are mainly troublesome in early spring when food is scarce and is lacking in variety. Pea guards made of wire netting are most effective, provided the ends are blocked, but they should be removed before the peas become entangled in the wire.

There are numerous other methods of protection, but their effectiveness depends on thoroughness of application and other factors. Spraying with bitter substances such as an infusion of alum or quassia in water (with soap as a spreader) or dusting the rows with sawdust, lime sulphur, or superphosphate gives varying degrees of protection. Cotton stretched over the shoots is also effective if a number of strands, which may be criss-crossed or stretched in parallel lines, are used.

Varieties

Most seed catalogues give a list of varieties with heights and the approximate number of days each variety requires to mature. Popular varieties include the quicker-maturing varieties Little Marvel and William Massey and the intermediate varieties Victory Freezer, Green Crop, and Greenfeast.

Powdery mildew is often serious on pea crops in dry weather. Peas should be grown only where good cultural conditions can be maintained; that is, in moist, well drained soils of good humus content. Powdery mildew is difficult to control where conditions favour the disease, but dusting with finely ground sulphur or spraying with colloidal sulphur or "Karathane" usually gives good results.

Radishes

Small successional sowings of radish should be made as required. Cultural requirements are similar to those of carrots and beet, but as the crop matures much more quickly, it is more sensitive to adverse conditions. The soil should be well drained and the top 6 in. cultivated to a very fine tilth. It should be very rich in fine, well rotted organic matter; well rotted compost is excellent.

Seeds should be sown thinly (12 to 15 per foot of row) ¼ in. deep in rows which need be only 4 to 6 in. apart. The soil should be gently firmed after sowing, as the roots do not bulb well in loose soil. Seed can also be sown broadcast, but weeding is then more difficult.

The roots should never dry out and in midsummer shelter from the sun is advisable. This is best achieved by sowing in the shade of a taller crop.

The value of radishes lies in their fresh crispness and mild pungency. Pungency and fibre are, however, so greatly increased by slow growth or checks that in adverse conditions radishes are likely to be hot, pithy, and indigestible.

Radishes can be sown at any time of the year in well drained soil, provided there is sufficient moisture and soil temperature is high enough.

Swede Turnips

In growing conditions that suit them swede turnips mature in from 55 to 90 days, but growth and yield are greatly influenced by climate. Varieties that require a long growing season thrive best in a cool, moist climate with neither dry periods nor very heavy rain. Sunshine is not important; in fact, because of the moister conditions longer-maturing varieties generally do best in late autumn, when sunshine is reduced.

Good swedes are a very useful addition to the home garden, particularly in the far south, where conditions enhance their quality and flavour. Swedes are high yielding and, like turnips, do not require special soil, provided drainage is good and there is adequate moisture. They respond well to a soil moderately rich in well rotted organic matter. Soluble fertilisers can cause injury which affects the germination of swede and turnip seed. The safest fertiliser to apply is a mixture of superphosphate and finely ground limestone which has been mixed a few days before sowing; 2 oz per square yard should be a suitable dressing on many soils.

In the home garden swedes are usually grown for late autumn and winter use. In southern districts a sowing can be made in November or December; further north December or January is favoured. In very mild districts even February is not too late. Suitable varieties can be sown earlier where there is sufficient moisture for growth. However, as there is rarely much demand for swedes until late autumn and cool conditions are required for producing the best roots, it is usually advisable to delay sowing, provided the roots are able to make most of their growth before winter.

In some districts swedes are affected by an internal breakdown known as brown heart. It can be detected first when the plant is about 2 in. in diameter. If the root is cut deeply so that a right-angle piece is removed, a clearly defined zone will be seen near the centre with areas mottled greyish, brownish, and glassy, usually concentrically or radially. Leaves may be curled and brittle and the bulbs woody with a bitter taste.

Brown heart is caused by a deficiency of the element boron. It can be overcome by the application of ordinary borax, though in the home garden liberal dressings of organic manure will usually correct the deficiency. The ground should not be limed when this trouble occurs.

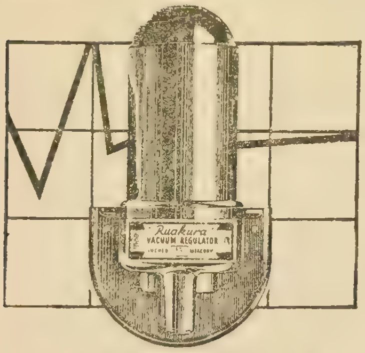
Good varieties of swedes for the home garden include Laing's Garden and Superlative Table.

Winter Greens

Winters greens such as brussels sprouts, cabbage, cauliflower or broccoli, fine-leafed kale, and leeks should be set out in most districts in January, if this has not been done. Where autumn conditions are mild February planting is satisfactory.

If the soil is dry, the plants should be watered, and in the poorer soils liquid manure made from animal manure or sulphate of ammonia at 1 oz to about 2 gallons of water should give improved growth. Alternatively, the soil can be topdressed with sulphate of ammonia at about 1 oz to the square yard. In exposed situations it may be advisable to support Brussels sprouts with stakes.

Steady Up Shed Vacuum



'RUAKURA'
VACUUM REGULATORS

Supersede old-fashioned relief valves, hold vacuum at a stable, constant level—ensure maximum yield and faster milking without injury to delicate udder tissues. Available from 10-16 inches of mercury, from your

MILKING MACHINE MAKER OR SUPPLY HOUSE **63/-** each

Manufactured by PLASTIC PRODUCTS LTD., Hamilton.

FARMERS

Reap the full benefit of the market by consigning your meat on your own account to:

THE STOCK BREEDERS' MEAT COMPANY LTD.
HEAD OFFICE 78-79 LONG LANE LONDON E.C.I

Highly experienced meat salesmen selling direct to retail trade.

CONSULT:

G. C. KEAN & CO. (N.Z.) LTD.
190-192 HEREFORD STREET CHRISTCHURCH
P.O. BOX 327

K1

ANOTHER DAVID BROWN ACHIEVEMENT!
THE NEW
DAVID BROWN 950

A new model that sets new standards in power and economy. The ideal all-purpose, all season tractor.

More POWER!

. . . still with renowned David Brown ECONOMY

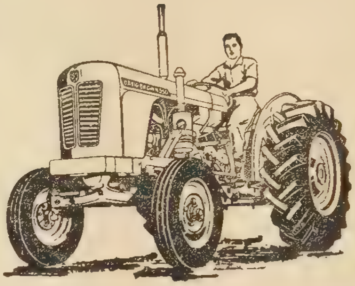
. . . and attractively priced

★ New, more powerful 42.5 b.h.p. direct-injection diesel engine.
★ New finger-light short-turn steering.
★ And many other new features to make this "950" the year's outstanding tractor.

PLUS David Brown's exclusive Traction Control Unit to eliminate wheelslip, and David Brown's Livedrive to give constant running hydraulics and P.T.O.

Ask your dealer for details of complete David Brown range. Wheel & Crawler models. Petrol & Diesel engines. Full range of matched implements. Easy **Terms.** 12 months' warranty.

N.Z. Distributors: **TODD BROS. LTD.,** Licensed Motor Vehicle Dealers, Wellington.



BOOK NOW!
For Happy Summer Holidays
BY RAILCAR OR TRAIN

Enjoy the restful, spacious comfort of modern railway travel services this summer. Thousands of seats are available on popular railcars and express trains linking more than 90 New Zealand towns and cities daily.

LOW FARES!

Ask at an Railway Booking Office, too, about Family Excursion Tickets, Tourist Excursion Tickets, Bulk Travel Vouchers, Season Tickets, etc.

Enjoy Low-Priced Travel Comfort!

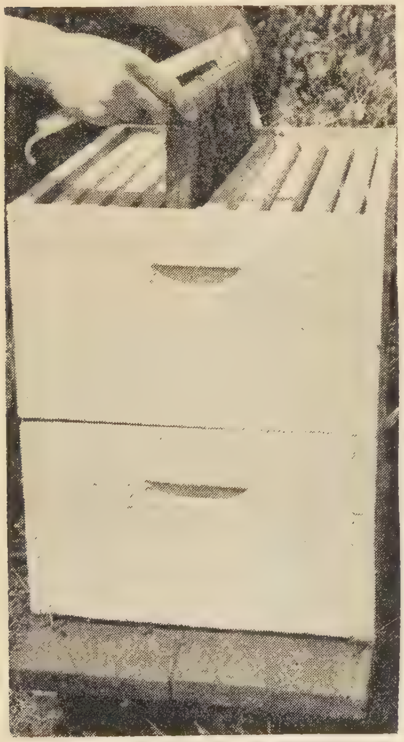
NEW ZEALAND RAILWAYS

Seasonal Notes for the Domestic Beekeeper

Colony Requirements during the Honey Flow and Importance of Hive Ventilation

BEEKEEPERS who have managed their hives correctly during spring should now be seeing the results in the storing of surplus honey by the bees. Each hive should be headed by a young, vigorous queen and swarming must be prevented if populous hives are to be maintained to take full advantage of the main honey flow, which begins in most districts about December.

ONCE the flow has begun the swarming impulse usually ceases, but hives must be provided with enough room for the storage of the nectar as it comes in. This extra space on the hive at this time of the year is most important, as it not only reduces congestion in the brood nest but makes available much needed room for the temporary storage of nectar while the bees are ripening or inverting it.



Drawn comb placed among the frames of foundation to act as a bait and induce the bees to come up and work the frames of foundation wax.

Nectar as gathered by bees from the blossoms is merely a sweet substance comprising mostly water and sucrose sugars. The percentage of sucrose sugar varies according to the source from which it is gathered.

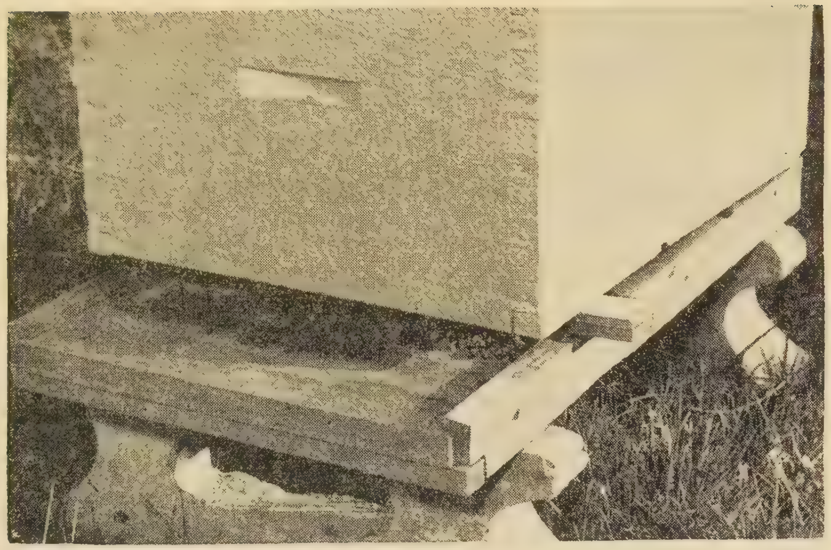
By D. A. BRISCOE,
Apiary Instructor,
Department of Agriculture,
Tauranga

When nectar is brought into the hive the harvesting bees transfer their loads to the "house bees", which suspend the loads in droplets within the cells in the first convenient combs available. In this manner some of the excess water is removed. Later this nectar is withdrawn from its temporary position and formed into small globules on the tongues of the bees to be ribboned out in thin streamers until the water content is reduced to the desired minimum. During this process certain additions are made by the bees from their own glands which cause an inversion of the sucrose sugar to levulose and dextrose sugars. With this inversion, nectar is converted into honey and stored by the bees for their future requirements.

Strong colonies at this time of the year should be occupying at least two, if not three, full-depth boxes in most localities. The adding of an additional super depends on the density of the nectar flow at the time. It may even be found necessary to add a further super if the flow is particularly heavy. However, supers should not be added to the hive beyond requirements for the nectar being brought in. When hives are supered too early the brood nest is liable to be extended into these supers and the presence of brood and pollen prevents the correct storage of the honey crop.

Another super of combs should be added when the top super has the middle combs capped and the outside ones partly filled.

When the honey flow is about to start a good indication that the hive requires another super is when the bees begin to build out the frames along the top edges with new wax, giving them a fresh appearance. Before the super is added the hive should be re-arranged so that the unsealed brood is placed in the bottom box and the top box given over to sealed combs of brood. This method will also act



[*Commercial Studios*

Use of a batten between super and bottom board to increase ventilation at the entrance of a hive in summer.

as a sort of queen excluder to the honey super when it is added, as a queen seldom will pass over a completely capped frame of brood to the super above.

It is a good idea to use "bait" combs (drawn combs containing a little honey) when extra supers are added. These can be taken from one of the lower boxes and placed in the centre of the super being added to encourage the bees to enter the new super without delay. The space from where the bait comb was taken should be filled with another comb or a frame fitted with comb foundation.

The use of queen excluders on hives has advantages and disadvantages. Some beekeepers prefer to use them to make sure that the queen is kept in the brood nest below; others maintain that with efficient brood nest manipulation excluders are seldom necessary. An excluder restricts the passage of the bees to the honey supers, and the beekeeper has to decide whether to continue with their use to restrict the passage of the queen and also prevent the storage of pollen in the honey super or to try to become confident enough to manage without them.

If foundation comb only is used in the honey super, queen excluders should not be used, as the bees seldom travel through an excluder to work foundation; quite often a hive will swarm first.

Securing Good Combs

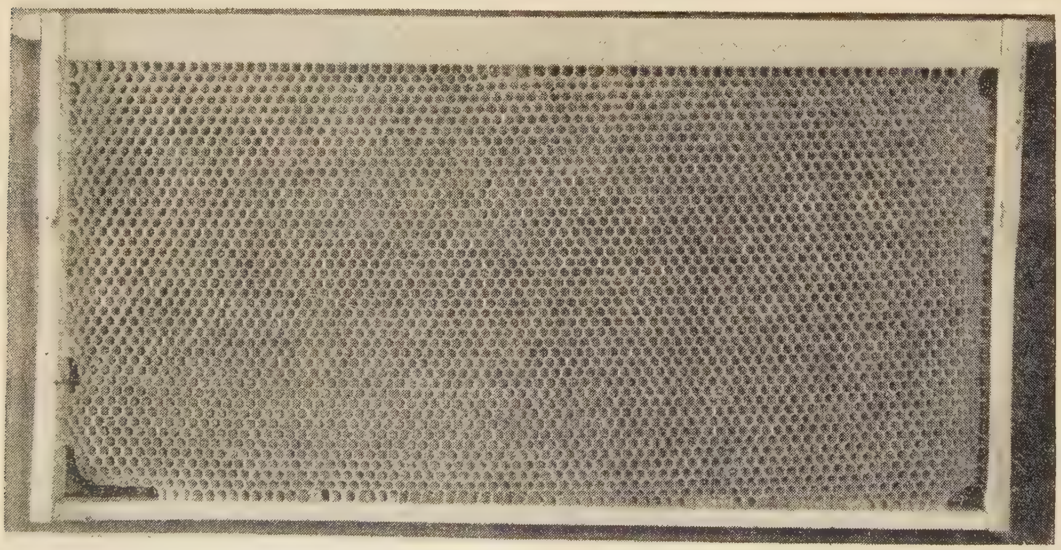
Provision has to be made each year for new combs, as these are needed the following spring for replacing damaged or broken combs or those containing too many drone cells. Good combs can be secured by placing above the brood nest frames fitted with full sheets of foundation between drawn-out combs and leaving them with the colony for the storage of honey during the honey flow. They can then be extracted and stored until required the following season.

Importance of Hive Ventilation

As the weather is usually hottest during the honey flow, hives should receive adequate ventilation. The interior of the hive becomes extremely warm and if during hot days a number of bees at the entrance to the hive are fanning to create a draught or clustering outside the hive, more ventilation is obviously needed. This can readily be supplied by giving extra space at the entrance. The front of the hive should be lifted and two small blocks of wood about 1 in. thick placed at the corners.

If the apiary is in a particularly hot area, a small piece of wood inserted between the honey super (supers) and the brood nest will give added ventilation as well as allow returning nectar gatherers to enter directly into the honey super. Immediately the nectar flow starts to ease, however, these blocks between the honey super and brood nest should be removed to discourage robbing bees.

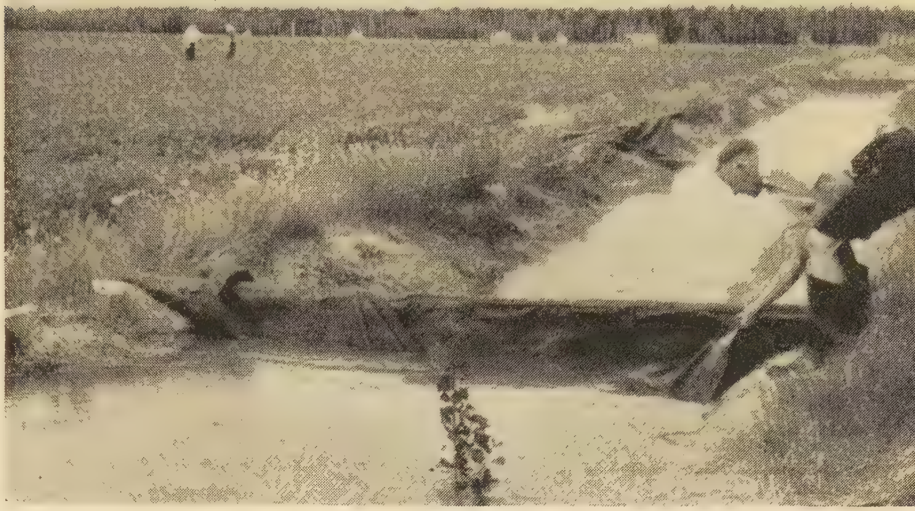
When bees in the hive are ripening the nectar the air becomes saturated with moisture, which the bees remove by fanning at the entrance and creating currents of air through the hive. If ventilation is inadequate or the entrance to the hive too small, conditions within the hive become unbearable and can cause bees to ease up in their nectar gathering; a forced swarm may even result.



A good comb for all purposes.

IRRIGATION RESEARCH AT WINCHMORE

INITIAL responses to irrigation of lucerne at the Winchmore Irrigation Research Station on a fixed time basis were good, but the stand subsequently deteriorated rapidly. Results of trials to see if irrigation would be more effective on a soil moisture basis are reported in this article. Fertiliser placement investigations were incorporated with the trials to see if deeper enrichment of the soil would assist deeper rooting of the lucerne and thus increase its drought resistance.



HEADING PHOTOGRAPH: A lucerne trial under border dike irrigation.

Effects of Border Dike Irrigation and Fertiliser Placement on Lucerne

By J. LAMMERINK,
Scientific Officer,
Department of Agriculture's
Winchmore Irrigation
Research Station

FLOODING is the most common method of applying water to lucerne in Mid Canterbury. Border dike irrigation is a system of controlled flooding in which the land is divided into strips or borders with small levees or dikes along the sides. To cover the full length of each border water well in excess of the water-holding capacity of the soil is required. This surplus water, which will generally be particularly high because of the rank growth of lucerne, will percolate through the profile, probably removing part of the nutrients out of the topsoil.

In previous trials at Winchmore irrigation of lucerne was carried out on a fixed time basis with one or two irrigations between cuts. This was fully described in an article in the January 1959 issue of the "New Zealand Journal of Agriculture", by B. A. Lauder, Farm Advisory Officer, Department of Agriculture, Ashburton.

Initial responses to irrigation were in general good, but a rapid deterioration of the stand with an ingress of weed grasses, *Agrostis* species (browntop) in particular, occurred and this deterioration tended to increase with the number of irrigations applied. It appeared that irrigation on a soil moisture basis might be more effective, as allowance would be made for rainfall and evapotranspiration, and it was decided to conduct a trial in which the responses to irrigation on a soil moisture basis would be determined.

The efficacy of fertiliser placement was also investigated in this trial, because it was thought that enrichment of the soil to a greater depth than is achieved by normal surface treatment might assist the lucerne to root more deeply. This would increase its drought resistance and also the volume of soil from which it could draw nutrients.

Soil Type

The trial was carried out on Lismore stony silt loam, which is described as an immature alluvial soil derived from greywacke. It consists of 7 to 9 in. of light brownish-grey stony silt loam overlying 12 to 15 in. of brownish-yellow heavy silt loam of which the bottom 6 in. is stony. The rest of the profile is composed of stony gravel with a very low water-holding capacity.

Objectives of Trial

The objectives of the trial were:

1. To investigate the effectiveness of irrigation on a soil moisture basis.
2. To compare partial ploughing down of fertilisers, including lime, with broadcasting.

Description of Trial

Irrigation Treatments

The main treatments of this trial, which was laid down during the 1954-55 season, were:

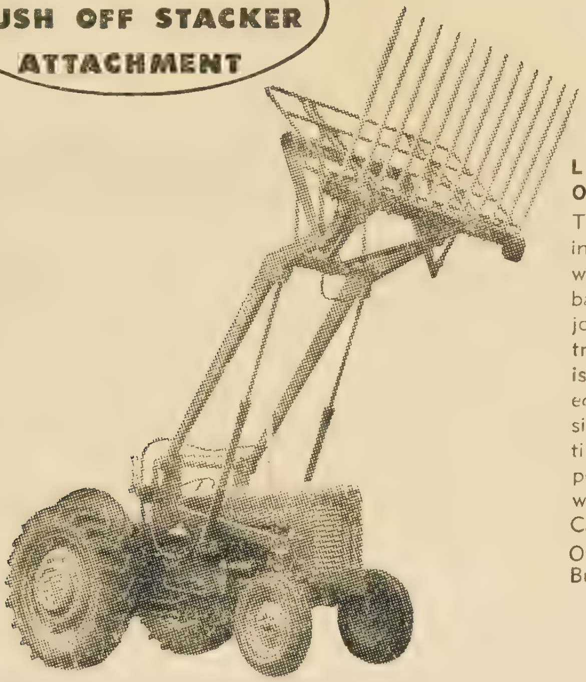
1. No irrigation.
2. Irrigated whenever the soil moisture level was down to wilting point (at 1 in. to 6 in. depth).
3. Irrigated when half of available soil moisture was depleted (also at 1 in. to 6 in. depth).

Soil moisture levels were measured gravimetrically (samples were taken with a 1 in. diameter core sampler, weighed, dried at 105 degrees C, and reweighed). The average field capacity and wilting point in the top 6 in. of soil were determined as 25 to 28 per cent and 10 per cent respectively. Each application of water should bring the soil moisture level up to field capacity. It was estimated that whenever the trial was irrigated satisfactorily as much as 4 to 6 in. was applied and the surplus water would be 1 to 2 in. per irrigation for treatment 2 and 2 to 4 in. for treatment 3, the exact amount depending on the stage of growth.

The irrigation treatments were replicated three times.

VERSATILE HYDRAULIC POWER...

LB LOADER WITH PUSH OFF STACKER ATTACHMENT



INSTANTLY RESPONSIVE FULL HYDRAULIC CONTROL.

L B Loader with The Push Off Stacker Attachment

This is one piece of matching equipment that really works for you — loading baled hay and similar lifting jobs with full hydraulic control. The Push Off Stacker is available as optional equipment, and is so designed for quick simple fitting or removal. Maximum push off height 15ft. 0in., width 7ft. 11in. (12 Tynes). Capacity 1,200 lbs.

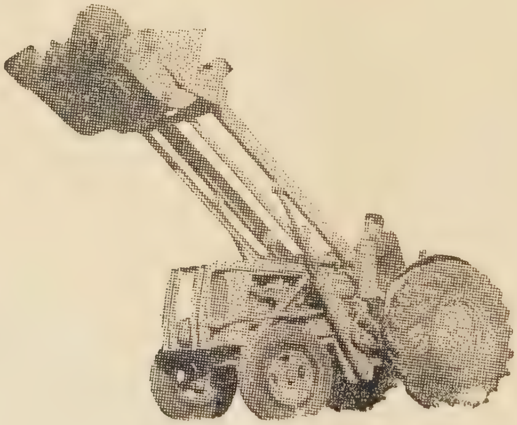
Other equipment includes: Bucket, blade and haysweep.

The Model L F Loader

For Fordson Major tractors, features full hydraulic control, powerful crowding action and controlled tipping. Matching equipment includes BLADE, CLAMSHEL, FORKLIFT, and CONCRETE BUCKET. Engineered to handle a multitude of jobs smoothly and efficiently. The L F Loader means year round performance and operating profits.

INCREASE THE PERFORMANCE OF YOUR TRACTOR WITH . . .

LF LOADER



HYDRAULIC HI-TRAC EQUIPMENT

FOR FERGUSON, FORDSON, NUFFIELD TRACTORS.

POST THIS COUPON NOW

Please send me full details of Stacker/Loader for the .... Tractor.

Name ....

Address ....

....

Tick which applies. JA34

WRITE FOR FULL PARTICULARS TO THE MANUFACTURERS :

C. W. F. HAMILTON & CO. LTD.

P.O. BOX 709 CHRISTCHURCH

H2

Fertiliser Placement

Each main plot, a border 5 chains x ½ chain, was split in two subtreatments as follows:

(a) Broadcast on surface: Carbonate of lime (2¼ tons per acre), superphosphate (3.1 cwt per acre), and muriate of potash (3.1 cwt per acre) at sowing.

(b) Ploughed down: Carbonate of lime (2 tons per acre), superphosphate (3 cwt per acre), and muriate of potash (3 cwt per acre) 12 weeks before sowing with small amounts of carbonate of lime (¾ ton per acre), superphosphate (0.8 cwt per acre), and muriate of potash (0.8 cwt per acre) applied to the surface at sowing.

Establishment

On 29 December 1954 New Zealand certified lucerne (15 lb per acre) was drilled in 7 in. rows on an area which had been in lupins, Montgomery red clover for hay, swedes, barley, and green feed barley between 1949 and 1954. Though some lime and superphosphate were applied during that period, crop yields were poor and indicated rather low soil fertility. The soil was hard and dry at sowing, and hot, dry weather with less than 1 in. of rain occurred in the following four weeks. In spite of the poor soil and weather the newly sown lucerne showed a good strike and initial development.

Management

No irrigation was given during the first season, and the first application was given in the spring of 1955. The trial received basal dressings of carbonate of lime at ½ ton per acre in the winters of 1955 and 1956. Superphosphate was applied in the winters of 1955, 1956, and 1957 at 1½ cwt, 2 cwt, and 3 cwt per acre.

The trial was cut for hay four times a year, with the exception of the unirrigated treatment during the 1955-56 season. This treatment missed out on the cuts of 5 January, 26 February, and 20 April. All hay was removed from the trial area and the stand was not grazed.

Rainfall and Irrigation

In the Mid Canterbury irrigation schemes irrigation water is available from September to April inclusive. The best responses to irrigation are in general obtained during November-February, when temperatures and consequently evapotranspiration are high.

During the three years of the trial rainfall figures were:

	Nov.-Feb. inclusive in.	Sept.-April inclusive in.
1955-56	7.21	15.40
1956-57	10.96	28.46
1957-58	13.07	22.94
Normal*	10.78	20.43

* Average for Ashburton (1921-1950 inclusive)

The numbers of applied irrigations were:

	Nov.-Feb. inclusive Treatment 1	2	3	Sept.-April inclusive Treatment 1	2	3
1955-56	0	5	10	0	6	13
1956-57	0	2	3	0	2	4
1957-58	0	1	3	0	1	5*

* Of these five irrigations one was applied after the last cut and therefore did not contribute to the total production for 1957-58.

The number of irrigations was exceptionally high for the 1955-56 season. This was largely because of the poor penetration of water, as the topsoil was very compact. Irrigation aggravated the sealing of the surface and complete replenishment of the soil moisture to field capacity was not attained for four out of six irrigations on treatment 2 and for 10 out of a total of 13 for treatment 3. Penetration of the irrigation water was satisfactory in the following seasons. Nevertheless it is highly probable that the sealing of the soil surface in the first irrigation season had a permanently adverse effect on the young developing stand.

Results

Responses to Irrigation

The next table summarises the annual yields of dry matter obtained from each irrigation treatment. The yields in lb per acre are averages of the two placement subtreatments.

Treatment (mean a and b)	1955-56	1956-57	1957-58	Average	Relative
1. Unirrigated	2,530	7,940	8,920	6,460	100
2. Irrigated at wilting point	9,120	8,510	8,280	8,640	134
3. Irrigated at 50 per cent available soil moisture	11,910	8,380	8,130	9,470	147

Excellent responses to irrigation were obtained only during 1955-56, with differences in total yield statistically significant at 1 per cent.

Both irrigation treatments gave significant responses for the 1956-57 season, but treatment 3 was lower in production than treatment 2. Differences between treatments 1 and 2 were significant at 1 per cent, those between treatments 1 and 3 only at 5 per cent.

During 1957-58 irrigation showed a depressive effect on total yield, which reached significance (at 5 per cent) for treatment 3, though growth responses were recorded for two individual cuts.

Effect of Ploughing down Fertilisers

The next table summarises the production for the fertiliser placement plots, yields being averages of the three irrigation treatments:

Subtreatment	Total dry matter yield (in lb per acre) 1955-56	1956-57	1957-58	Average	Relative
(a) Surface application of fertiliser ..	8,050	8,280	8,580	8,300	100
(b) Fertiliser ploughed down	7,670	8,270	8,310	8,080	97

Differences in yield between subtreatments did not reach significance for any irrigation treatment on any occasion.

Soil Testing

The trial was soil sampled on four occasions: in September 1954 before laying down and in July 1955, 1956, and 1957 before topdressing. All samplings were carried out at three depths, 0 to 3 in., 3 to 6 in., and 6 to 9 in. It was found that by ploughing down pH, calcium, potassium, and phosphorus were raised in the subsoil, but reduced in the top 3 in.

Most of the differences in the quick test tables on page 557 were highly significant. As placement had no effect on productivity and persistency of lucerne, no further details are given. While differences in soil test due to placement gradually decreased, small differences developed between the main irrigation treatments, some of which reached significance by 1957.

Irrigation showed a tendency to increase pH and calcium values and to decrease potassium and phosphorus. Composite samples were also tested for exchangeable bases. Differences in potassium between irrigation treatments were confirmed as shown in the following table:

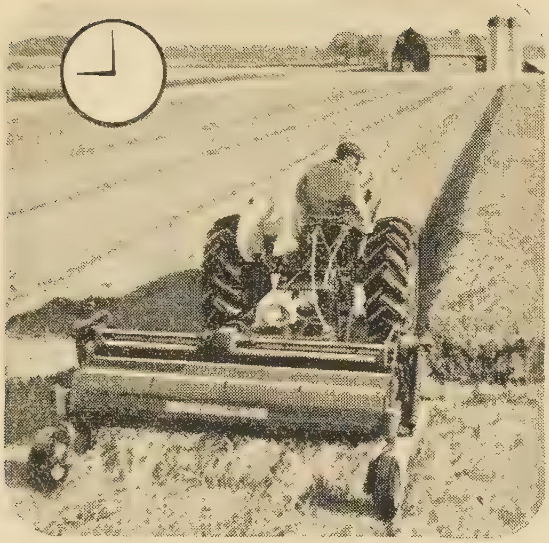
EXCHANGEABLE POTASSIUM (MILLIGRAM EQUIVALENTS PER 100 GRAMS) IN JULY 1957

Treatment	Depth 0-3 in.	Depth 3-6 in.	Depth 6-9 in.	Average
1a ..	.50	.23	.23	.32
b ..	.43	.20	.23	.29
2a ..	.35	.20	.20	.25
b ..	.31	.20	.20	.24
3a ..	.30	.15	.16	.20
b ..	.27	.16	.16	.20

Appearance

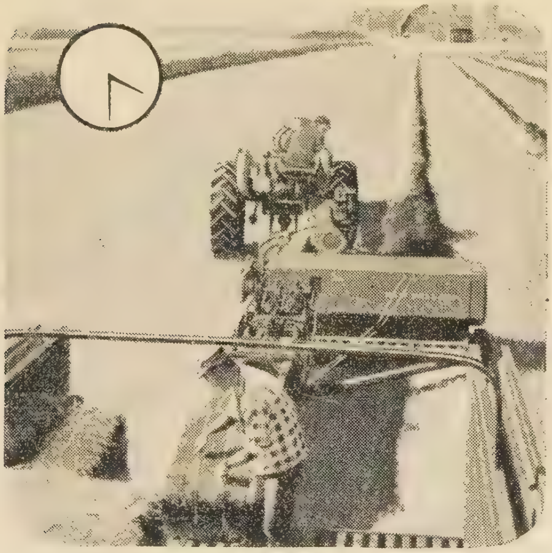
During winter 1956 the stand looked dense and vigorous on all treatments with weed grasses practically absent.

The lucerne appeared still to be in reasonably good order a year later. Only a small amount of browntop was present, but this seemed to be spreading from the dikes, especially on the irrigated plots. However, by the end of September 1957 great differences were showing up between treatments. Lucerne which was frequently irrigated in the two previous years was stunted and pale green. The lucerne which was irrigated at wilting point, on the other hand, had a much healthier colour, but was not as vigorous as the unirrigated plants. The plant mortality of the irrigated lucerne (especially on treatment 3) was fairly high during 1957-58, while browntop increased much in density on both placement subtreatments.

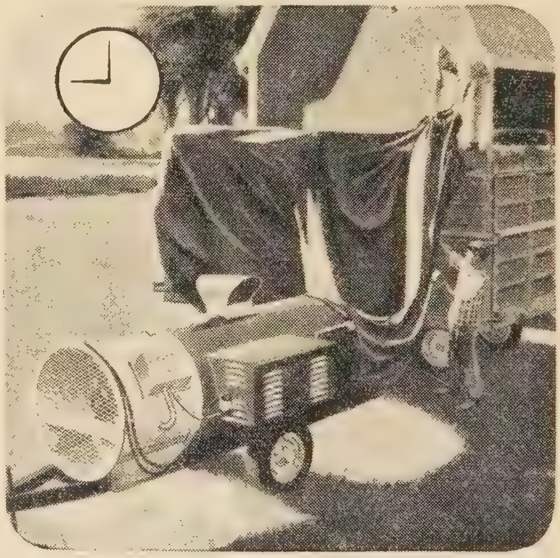


Mow and crush in one operation early in the morning.

Rake uniform, fast-drying windrows in early afternoon.



Bale in the late afternoon. Load bales on drying wagon.



Dry through the night automatically. Store hay next morning.

Hay-in-a-Day!

New system of haymaking moves hay from standing crop to storage in 24 hours . . . saves time, labour and important nutrients!

You can put up as much as 10 tons of hay in a single day — now that New Holland offers you time-table performance with time-rated machines. New Holland's mower-crusher, rake, baler, crop dryer and crop drying wagons are designed to work fast . . . speed curing so you can schedule faster, more economical haying operations than ever before.

Hay-in-a-Day means you save your hay from parching sun and soaking rain . . . keep all the leafy greenness and rich feed value. It's a great new system of farm management that can bring you far bigger profits. New Holland Machine Company Division of Sperry Rand Corporation.

NEW HOLLAND

NH *"First in Grassland Farming"*

FREE CATALOGUE! Doring Implement Distributors, P.O. Box 1179, Wellington, C.1., New Zealand.

Please send me free literature on New Holland's Hay-in-a-Day. System.

Name ....

Address ....

J9-8

Chemical Analysis of Herbage

Adverse effects of previous irrigations were showing up so clearly in the spring of 1957 that it was decided to sample the top growth for a comprehensive chemical analysis. The first cut of the season, taken on 18 October 1957 before irrigation was applied to any treatment, was sampled at random.

Analysis of the dried material was carried out at the Rukuhia Soil Research Station for the following elements: nitrogen, phosphorus, potassium, sodium, magnesium, calcium, sulphur, zinc, copper, boron, manganese, iron, and aluminium. The levels of two nutrients are interesting: (a) The copper content, as measured spectrographically, was low for all treatments, with an average of 5.4 p.p.m. (parts per million), range 4.0 to 6.7 p.p.m. (b) Consistent differences were shown for potassium with significantly (at 5 per cent) lower levels on the irrigated than on the unirrigated plots. Differences in yield between all treatments were also significant (at 1 per cent).

CUT TAKEN ON 18/10/57

Treatment (mean a and b)	Potassium per cent of dry matter	Relative dry matter yield
1. Unirrigated	2.39	100
2. Irrigated at wilting point	2.06	74
3. Irrigated at 50 per cent available soil moisture	1.96	57

Root Development

After the trial was closed down at the end of the 1957-58 season, plant numbers and rooting systems were investigated. Any lack of productivity appeared not to be due to low numbers despite a high plant mortality. Though most plants on all treatments showed in general thin and branched roots infected with *Stagonospora* (root rot), there was an indication that the vigour of roots and presence of healthy nodules were inversely related to the frequency of irrigation but not affected by fertiliser placement.

Residual Effects

The whole trial area was uniformly treated during 1958-59, a season which was about as dry as 1955-56, with 7.70 in. of rain from November through February. Three irrigations were applied to all treatments, but no yield data were collected. Residual differences were, however, clear-cut. The unthriftiness of lucerne and the incidence of browntop appeared to be dependent on the number of previously applied irrigations. A final soil sampling carried out in February 1959 showed that all differences between irrigation treatments had disappeared. Slight differences still occurred between placement subtreatments with ploughing down lowering pH in the top 3 in., but raising it in the 3 to 6 in. and 6 to 9 in. levels.

Two border-diked areas of lucerne in foreground compared with unirrigated area in background.

SOIL SAMPLING IN JULY 1955—QUICK TESTS

Subtreatment	pH Depth 0-3 in.	pH Depth 3-6 in.	pH Depth 6-9 in.	Calcium Depth 0-3 in.	Calcium Depth 3-6 in.	Calcium Depth 6-9 in.
(a) Surface application	6.88	5.92	5.57	16.1	6.3	4.0
(b) Ploughed down	6.82	6.54	5.84	12.1	10.8	5.3

Subtreatment	Potassium Depth 0-3 in.	Potassium Depth 3-6 in.	Potassium Depth 6-9 in.	Phosphorus Depth 0-3 in.	Phosphorus Depth 3-6 in.	Phosphorus Depth 6-9 in.
(a) Surface application	16.1	5.9	4.6	11.8	7.1	3.9
(b) Ploughed down	10.3	7.8	5.6	10.2	8.9	4.3

SOIL SAMPLING IN JULY 1957—QUICK TESTS

Treatment	pH Depth 0-3 in.	pH Depth 3-6 in.	pH Depth 6-9 in.	Calcium Depth 0-3 in.	Calcium Depth 3-6 in.	Calcium Depth 6-9 in.
1. Unirrigated	6.98	6.43	5.90	13.8	8.2	3.8
2. Irrigated at wilting point	7.10	6.60	5.97	14.2	8.7	3.5
3. Irrigated at 50 per cent available soil moisture	7.21	6.73	6.01	15.5	9.5	3.5

Treatment	Potassium Depth 0-3 in.	Potassium Depth 3-6 in.	Potassium Depth 6-9 in.	Phosphorus Depth 0-3 in.	Phosphorus Depth 3-6 in.	Phosphorus Depth 6-9 in.
1. Unirrigated	6.8	2.8	2.8	13.4	6.3	3.0
2. Irrigated at wilting point	4 5	2.5	2.4	8.7	5.3	2.8
3. Irrigated at 50 per cent available soil moisture	4.5	2.3	2.0	9.8	5.2	2.3

Comments

1. After three years it was clear that even under a system of irrigation on a soil moisture basis the deterioration of the stand increased with the number of irrigations. Nevertheless a yield response of 34 per cent was obtained over the three-year period by irrigating at wilting point with a total of nine irrigations. Irrigation at 50 per cent available soil moisture with a total of 21 irrigations gave a 47 per cent response over the same period.

2. The ingress of browntop was partly responsible for the decrease in vigour of the irrigated lucerne. However, the aggressiveness of browntop appeared to be principally a symptom of the unthriftiness of irrigated lucerne, as the vigour of irrigated lucerne was not much greater in browntop-free patches than in heavily infested parts.

3. The levels of potassium in the soil and in the herbage showed a definite tendency to be reduced by the number of irrigations. It is not known whether this reduction was directly due to irrigation or to the removal of potassium in the hay. No potassic fertilisers were applied after sowing. Good responses to potash have been obtained on irrigated lucerne at Winchmore.

4. Ploughing down of lime, superphosphate, and muriate of potash did not give any advantage over surface application just before sowing.

Footnote: This trial was designed and laid down by B. A. Lauder, a former Research Officer at Winchmore.

SENSATIONAL DEVELOPMENT!

NEW
Yates
G.K.26
KILLS GORSE

KILLS GORSE FASTER!

PRACTICAL ADVANTAGES . . .

1. G.K.2-6 kills Gorse up to fifty per cent quicker than 2,4,5-T under warm temperatures.
2. Four to six weeks after spraying Gorse with G.K.2-6 the plant is brown and disintegrating. Full coverage is essential.
3. Hence, any parts of the plant missed by ordinary spraying can be detected and resprayed.
4. In as little as three and a half months, the plant is completely dead and the fibrous tissue is breaking down.
5. This new chemical aid, which gives you an amazing quick kill, is now available.

Available from Local Yates Hormone Distributors Everywhere.

Yates G.K. 2-6

Master Distributors: **ARTHUR YATES & CO. LTD.,**
AUCKLAND :: CHRISTCHURCH :: PALMERSTON NORTH :: WHANGAREI

GREENFEED IN THE BAG!

AVOID FACIAL ECZEMA
AND KEEP EWES FLUSHED FOR TUPPING

Springfeed (Dehydrated) Lucerne Pellets are the SAFE way of feeding lucerne to sheep—2 oz. per sheep per day for four weeks will provide sufficient green feed whilst sheep are shut off from dangerous pastures, and will also flush ewes to increase lambing percentage. Available in 50 lb. waxed multiwall bags.

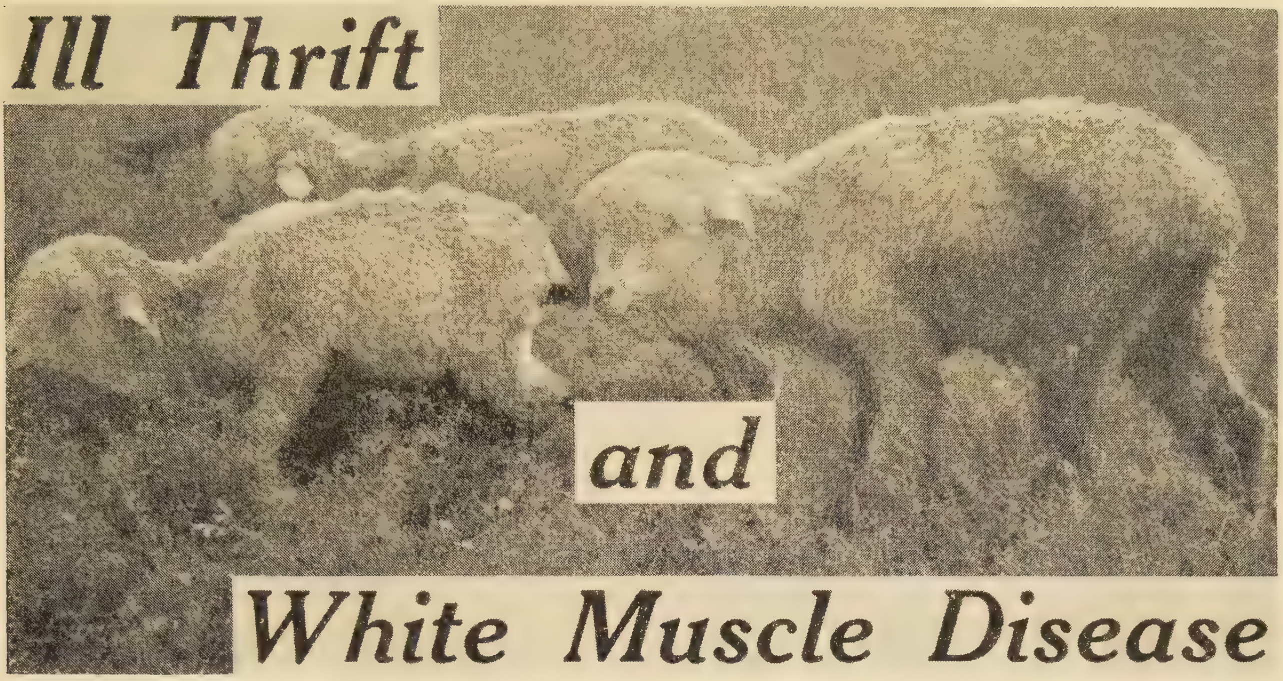
"Springfeed" **(DEHYDRATED) LUCERNE PELLETS**

AT ALL STOCK AND STATION AGENTS

For further particulars please write to
MARLBOROUGH LUCERNE MEAL CO. LTD. P.O. BOX 193, BLENHEIM

WIDESPREAD RESEARCH INTO

Ill Thrift and White Muscle Disease



SEVERE losses in sheep flocks in some districts in recent years have been attributed to ill thrift and white muscle disease. District surveys of losses and field work of some of the investigations have been apparent to farmers, but, perhaps because no panacea for controlling or curing the conditions has been produced, there has been a tendency to be critical of the attention given to the problems by research workers. That investigation has been considerable, some of it for some years past, and that there are many complexities in the studies, is apparent in the following summary of work done and in progress at several research organisations.

At Ruakura

INVESTIGATIONS at the Department of Agriculture's Ruakura Animal Research Station over a number of years have been directed toward defining the parts played by parasitism, stage of growth of pasture, and the role of pasture species.

Work has been conducted on both hill country and fat lamb farms.

There has been close collaboration with the Department of Agriculture's Manutuke Research Station, Gisborne, which has supplied dried grass from paddocks on which lambs were unthrifty and from others on which growth was very good.

It has been shown that ill thrift can occur in the absence of parasitism and that in general it can be prevented by feeding on mature pasture, particularly mature white clover.

The part played by non-protein nitrogen fractions in pasture and the role of rumen organisms have also been studied recently.

* * *

At Wallaceville

Over many years the Department of Agriculture's Wallaceville Animal Research Station has studied the role of parasites and trace elements. Systems of drenching against parasites have been evolved and the Stock Remedies Board now insists that all worm drenches should be made to standards evolved at Wallaceville.

Cobalt Trials

Trials with cobalt have defined the areas in which acute cobalt deficiency occurs and these are now regularly topdressed with cobaltised superphosphate.

More recently attention has been directed to marginal deficiencies in cobalt and arrangements have been made for trials with cobalt bullets to be conducted by officers of the Animal Industry and Farm Advisory Divisions wherever cobalt deficiency is suspected.

Methods have been evolved for diagnosing cobalt deficiency by analysing livers for cobalt and more recently for vitamin B_{12}.

Selenium

During the past year it has been shown that selenium deficiency can cause both white muscle disease and ill thrift.

Some **30 trials** have been conducted on farms in the **North Island** and 25 on farms in the **South Island.**

An extensive trial has been started at the Department's Flock House farm near Bulls.

Available methods for determining the concentration of selenium in pasture are not sufficiently delicate to measure the very small amounts present. These may be less than 1 part in 10 million. Chemists at Wallaceville, Rukuhia Soil Research Station, the Plant Chemistry Division, the Dominion Laboratory, and the Dental School are seeking to evolve more delicate methods.

There is good evidence that in a number of widely dispersed areas in both islands, especially on lighter soils, selenium deficiency causes ill thrift, white muscle disease, and possibly low lambing percentages.

Investigations are planned to determine the best methods of diagnosing selenium deficiency and correcting it.

Some work has been done at Wallaceville to determine the role of micro-organisms in the rumen in the production of toxic substances under certain feeding conditions.

* * *

At Plant Chemistry Division

Over many years the Plant Chemistry Division of the Department of Scientific and Industrial Research has studied the protein and other nitrogenous products in pasture.

Recently trials conducted in collaboration with Massey Agricultural College have shown that the non-protein nitrogen fractions are very high during autumn and one particular fraction appears to be unusually high in pasture causing ill thrift.

Other research organisations have supplied pastures to Plant Chemistry Division for analysis.

This line of attack may help to elucidate the cause of ill thrift not due to deficiencies or parasites.

* * *

At Lincoln College

Trials are being conducted at Lincoln (Canterbury Agricultural) College and a number of South Island farms to investigate the role of **selenium** and to determine if individual pasture species are involved.

The Department of Agriculture is making £2,500 available to the College this year to finance these investigations.

* * *

At Winchmore

Trials have been conducted at the Department of Agriculture's Winchmore Irrigation Research Station during the past three years to determine the effect of stage of growth of pasture on both irrigated and non-irrigated paddocks.

Trials have also been conducted with **selenium, cobalt, copper,** and **worm drenches.**

* * *

Coordination

A meeting was held at Massey Agricultural College on 23 March 1959 to discuss progress in investigations of ill thrift and white muscle disease. This was attended by 23 research workers representing 12 research organisations.

On 20 May 1959 a meeting of chemists was held in Wellington to discuss chemical methods for determining the concentration of selenium. This was attended by 16 chemists from seven laboratories.

Information

A circular letter has been sent to all veterinarians in New Zealand giving the latest information on selenium and suggesting methods for conducting trials.

At Invermay

Trials are being conducted at the Department of Agriculture's Invermay Research Station with **selenium.**

* * *

At Soil Bureau

Studies are being made of the role of soil and pasture micro-organisms at the Soil Bureau, Department of Scientific and Industrial Research. The Soil Bureau is also collaborating with other research organisations in producing maps to show the distribution of trace element deficiencies.

A. and P. Show Dates

THE following are dates and venues of A. and P. shows up to the end of April:

NORTH ISLAND

January

1 January—Nuhaka at Nuhaka.
22 and 23 January—Feilding at Feilding.
*22 and 23 January—Wairoa County at Wairoa.
29 and 30 January—Horowhenua at Levin.
*30 January—North Kaipara at Paparoa.

February

3 February—Marton District at Marton.
4 February—Te Kauwhata at Te Kauwhata.
*5 and 6 February—Rodney at Warkworth.
6 February—Woodville at Woodville.
6 February—Rangitikei at Taihape.
9 and 10 February—Dannevirke at Dannevirke.
10 February—Te Awamutu at Te Awamutu.
12 and 13 February—Taranaki at New Plymouth.
12 and 13 February—Taumarunui District at Taumarunui.
13 February—Tauranga at Tauranga.
13 February—Pahiatua at Pahiatua.
*13 February—Hukerenui at Hukerenui.
13 February—Waiapu at Ruatoria.
16 February—Otorohanga at Otorohanga.
18 February—Matamata at Matamata.
19 and 20 February—Ohura at Nihoniho.
19 and 20 February—Franklin at Pukekohe.
19 and 20 February—Masterton at Masterton.
20 February—Te Puke at Te Puke.
24 February—Morrinsville at Morrinsville.
26 and 27 February—Te Kuiti and District at Te Kuiti.
26 and 27 February—Wellington and Hutt Valley at Trentham.
27 February—Mangonui County at Kaitaia.
*27 February—Putaruru District (Jubilee Show) at Putaruru.
27 February—Northern Wairoa at Arapohue.
27 February—Waimarino at Raetihi.
27 February—Whakatane at Whakatane.

March

5 March—Albany at Albany.
5 March—Opotiki at Opotiki.
*12 March—Kumeu District at Kumeu.
*19 March—Wellsford at Wellsford.

SOUTH ISLAND

January

16 January—Waikouaiti at Waikouaiti.
16 January—Wallace at Otautau.
23 January—Golden Bay at Takaka.
23 January—Palmerston and Waihemo at Palmerston.
23 January—Peninsula at Duvauchelle.
23 January—Waiau at Tuatapere.
26 and 27 January—Otago at Dunedin.
30 January—Banks Peninsula at Little River.

February

13 February—Inangahua at Reefton.
20 February—Maniototo at Ranfurly.
*20 February—Murchison at Murchison.
27 February—Central Otago at Omakau.
27 February—Kaikoura at Kaikoura.

March

5 March—Amuri at Rotherham.
5 March—Temuka and Geraldine at Winchester.
12 March—Mayfield at Mayfield.
12 March—Cheviot at Cheviot.
12 March—Mt. Benger at Roxburgh.
19 March—Upper Clutha at Wanaka.
19 March—Methven at Methven.
19 March—Hawarden at Hawarden.

April

*2 April—Oxford at Oxford.
9 April—Malvern at Sheffield.
18 April—Strath Taieri at Middlemarch.
*18 April—Mackenzie County at Fairlie.

* The Department of Agriculture exhibit will be staged at this show.

Wool Sales

The dates and venues of wool sales up to the end of May are:

18 December: Timaru.
13 January: Wanganui.
18 and 20 January: Auckland.
25 and 27 January: Napier.
1 and 3 February: Wellington.
15, 17, and 19 February: Christchurch.
24 and 26 February: Invercargill.
2 and 4 March: Dunedin.
9 March: Timaru.
23 March: Wanganui.
28 and 30 March: Auckland.
4 and 6 April: Napier.
11 April: Wellington.
23 April: Christchurch.
28 April: Dunedin.
2 and 4 May: Invercargill.
13 May: Wanganui.
18 May: Napier.
23 and 25 May: Auckland.
30 May: Wellington.

Crop Production

Linseed and Linen Flax

THE linseed and linen flax plants are of the same botanical species (*Linum usitatissimum*), but by selection two types of plants have been developed with features of widely differing economic significance. One group of varieties, known as linseed, has been selected for heavy yields of seed of high oil content, but the straw of these varieties has only a low percentage of linen fibre, of inferior quality. The other group, known as linen flax, has been selected for the high percentage of good fibre contained in the straw, but the yields of seed and oil of these varieties are lower than those from linseed. Though the two types of plants are very similar in appearance, they differ somewhat in their growing requirements. These differences and other factors are discussed in this article.

LINSEED

By E. DELAHUNTY,
Farm Advisory Officer, Department of Agriculture, Ashburton

LINSEED, once widely grown in arable areas of the North and South Islands, is now largely confined to the South Island, more especially to Canterbury, where it fits in well to the arable cropping programme and where over 80 per cent of New Zealand's linseed is now grown. Most of the remaining 20 per cent is grown in Otago and Southland.

GENERALLY, the crop is grown under contract and chiefly for the production of linseed oil, the by-products being converted into stock food. As locally produced oil competes on the local market with imported oil, the acreage sown in linseed and the grower's contract price are subject to the influences of overseas production and prices of linseed oil and are liable to fluctuate considerably from season to season.

Recent totals have been about 12,000 acres annually, but in the past up to 24,000 acres have been grown.

Soil and Climate Requirements

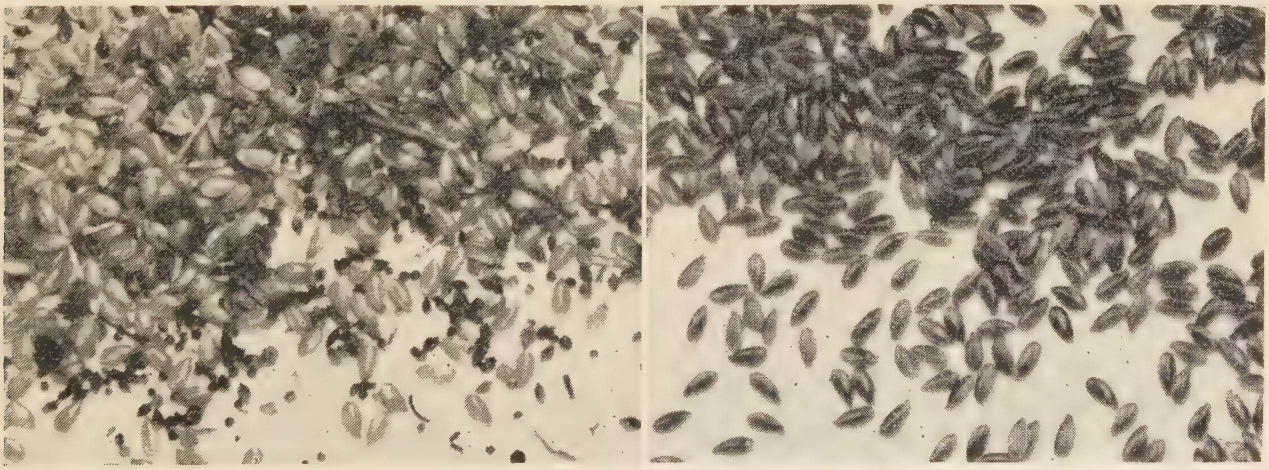
Linseed is not exacting in its soil requirements, but it does demand a well distributed rainfall to provide adequate moisture to its surface roots. After the seed has developed relatively dry conditions give ideal ripening with absence of second growth, and harvesting is easier.

Soil acidity levels are not critical, and the crop can be grown successfully on a wide variety of soils. It is sometimes grown in paddocks where winter sowing of wheat is not possible because of wet conditions. Good crops have been obtained out of browntop pastures in the foothills, on the clay downs, and on the better stony soils.

Yields are low on the poorer stony soils of the plains. On the heavy, rich soils linseed tends to ripen unevenly, growth is excessive, and harvesting difficult.

Place in Rotation

Linseed is generally sown on land cultivated out of run-out grass and the best crops are usually obtained under these conditions. Occasionally linseed is grown after a brassica crop (turnips or swedes) and under high fertility conditions odd good crops have been grown after a cereal crop.



Linseed with weed seed impurities.

A good premium sample of linseed.

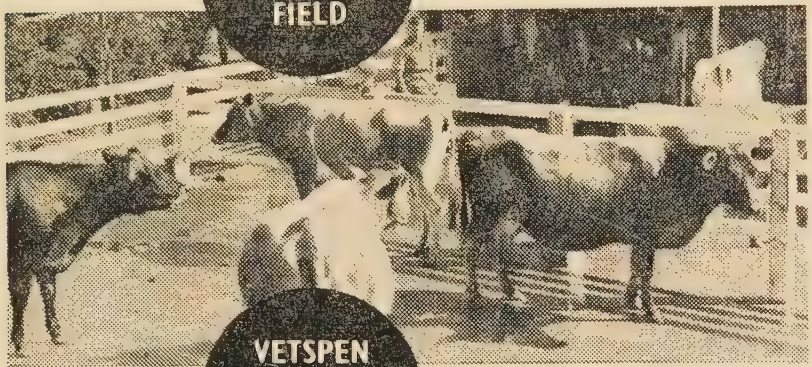
Control of weed growth is important in linseed production. Weeds compete with the crop for available nutrients, and because they remain green when the crop is ripening they prevent satisfactory direct heading of the crop.

VETSPEN

the GLAXO penicillin

FIRST IN THE FIELD

Safe . . . Simple . . . Effective



For the prevention and treatment of Mastitis. Don't let profit stealing Mastitis ravage your herd. Be prepared. Lay in a stock of Vetspen Cerate NOW!

VETSPEN PENICILLIN CERATE

THREE STRENGTHS

'25' 25,000 units penicillin per tube.

'50' 50,000 units penicillin per tube.

'100' 100,000 units penicillin per tube.

For ALL Farm Stock

For the quick, convenient, economical prevention and cure of penicillin-sensitive infections in all farm stock.

TWO STRENGTHS

'100' 100,000 units penicillin per tube.

'500' 500,000 units penicillin per tube.

VETSPEN HYPODERMIC INJECTION

PENICILLIN INJECTION

VETSPEN Penicillin BLOAT Powders & Tablets.
Prevent Bloat—Costs as little as 4d. per cow per week. Will not affect the quantity or quality of milk.
Available in 8 oz., 2½ lb. and 10 lb. tins, and tins containing 25 and 300 tablets.

VETSPEN RATION Penicillin Feed Supplement.
For Increased Yields . . . Increased Profits. Gives young animals a good start in life.
Available in tins of 8 ozs., 2½ lbs., and 10 lbs.

VET-CREME
The antiseptic lubricant for assisted lambing. Stops cross-infection between man and animal. Avoids damage to delicate tissues. Heals cracked and sore teats.
Available in 4 oz. tubes and 16 oz. jars.

First and Foremost

VETSPEN

Available from all chemists, stock and station agents.

GLAXO LABORATORIES (N.Z.) LTD.. PALMERSTON NORTH. V10.9

Wheat is the most popular crop to follow linseed, but almost any crop may be grown subsequently. Pasture establishment under linseed usually results in strong clovers but weak grasses, and the sowing of new pasture after a linseed crop usually necessitates hasty land preparation, late sowing, and consequent risk of failure.

Weed Control

Weed growth is important in linseed production. The weeds compete with the crop for available nutrients, and because they remain green when the crop is ripening, they prevent satisfactory direct heading of the crop.

Selection of land reasonably free of yarr, fathen, willow weed, and similar weeds aids the growing of clean, heavy, easily harvested crops. For satisfactory control of susceptible weeds with only temporary damage to the crop, linseed can be sprayed when 2 to 4 in. high with water-based hormone weedkillers. Aerial applications of crop desiccants, such as sodium arsenite and pentachlorphenol, have been successful for ripening linseed to allow direct heading of crops infested with willow weed.

Land Preparation

For small seeds such as linseed a thoroughly consolidated seedbed suitable for shallow drilling and able to retain moisture is required. A preliminary early surface working in May with a skim-ploughing, discing, or hustling preceding a deep ploughing in late winter is basic treatment for an ideal seedbed. A good, crumbly tilth is then readily obtained by timely use of grubber, roller, and harrows.

Varieties

Bull Moose, Rio, Bison, and Blue Rigel are a few of the many once widely grown varieties now discarded because of disease susceptibility, low yield, or poor oil content. Today the three most popular varieties are Golden Viking, Marine, and Koto, but trials conducted by the Department of Agriculture show that two new varieties, Redwood and Rocket, have considerable promise.

Golden Viking produces linseed of a high oil content; its straw is of medium length, and it is medium to late in maturing. The seed is light coloured and is subject to weathering under unfavourable conditions. Golden Viking is susceptible to rust and pasmo diseases, but selections recently made by the Crop Research Division of the Department of Scientific and Industrial Research reveal some resistance to these diseases.

Marine is an early maturing variety of medium straw length and is resistant to most races of rust. The oil content of Marine seed is lower than that of Golden Viking. Troubles can occur in harvesting this variety through the straw wrapping round the drums and elevators.

Koto is an early-maturing variety giving rather erratic yields. The seed has a relatively low oil content. Koto has a medium to long straw, is more susceptible to lodging than Marine, and is susceptible to rust.

Redwood is a rust-resistant, late-maturing variety from the United States that shows promise of high yields. The seed has a high oil content.

Rocket, produced in Canada, is also a rust-resistant, late-maturing variety which appears to be able to withstand droughts and poor fertility. It also is high in oil content.

Sowing

The average seeding rate is 50 lb per acre, but trials have shown that rates between 40 and 70 lb per acre do not affect yields. Rates as low as 40 lb per acre are commonly sown on light land and as much as 70 lb is used on heavy land. Heavy sowings may help to suppress weed growth, but profuse tillering by the plant normally makes heavy sowings pointless on clean land.

Sowing is normally done in October, but earlier sowing may be advisable on light land in favourable conditions to take advantage of the moisture present in the soil. Early sowing with a resultant early harvest usually produces the best crops owing to the most favourable conditions for growth and harvesting prevailing at those times. The young plants are frost resistant.

The crop is drilled through every coulter of a grain drill on a rolled surface with a set of light harrows trailed behind the drill. Shallow drilling (1 in. deep) with the coulters in line and using well worn tips is preferred.

There is little advantage in cross drilling, but good, clean, even crops have been grown when 3½ in. centre drills were used.

Fertilisers

Little is known of the phosphate requirement of linseed on different soil types, but it is customary to sow superphosphate with the seed to encourage a rapid initial establishment. In Canterbury 1 cwt per acre of superphosphate is normally sown, but in Otago and Southland heavier applications are common.

Neither sulphate of ammonia nor lime is applied before or after drilling linseed. At current prices it is very doubtful if economic results could be obtained from either of these manures.

Harvesting

The crop is ready to harvest about February or March when the straw turns golden and the bolls dry out so that the seed rattles freely within them. Under moister conditions the straw may remain green, but the bolls are dry and fit to harvest.

The straw is tough and in dull weather particularly difficult to cut.

In hot, dry conditions the crop can be direct headed if it is relatively free of weeds. Complete crushing of the bolls, and liberation of the seed, by the drum alone may prove difficult, but the installation of rollers (usually a metal and a rubber roller through which the crop passes) in front of the drum will give clean separation as well as an even feed.

Weedy crops are windrowed with a binder or mower, leaving a high stubble, and are picked up with a header some days later. Heavy rain after windrowing can cause heavy losses of tangled bolls and necessitate the use of a tedder before picking up.

Yields

Average crops approximate 10 cwt per acre in normal seasons, but average yields as high as 12 cwt per acre were recorded in a recent favourable season. Occasional crops on good land may yield better than a ton per acre.

Most crops are grown under a contract calling for a fair average quality of 92½ per cent pure whole seed with a moisture content of 10 per cent. Bonuses are paid for better quality seed and deductions are made for poorer quality seed. Seed with a moisture content of more than 10 per cent is accepted at a discount and a charge may be made by the factory against the farmer to cover the cost of drying the seed to this moisture level, as it cannot be safely stored in bulk with more than 10 per cent moisture.

Linseed Straw

Linseed straw contains an appreciable amount of coarse fibre which is almost pure cellulose. Attempts have been made in New Zealand to utilise linseed straw, but generally costs of harvesting, transporting, and processing have proved too high.

The straw has no feed value and stock losses have been recorded in instances where stock have had access to the stubble.

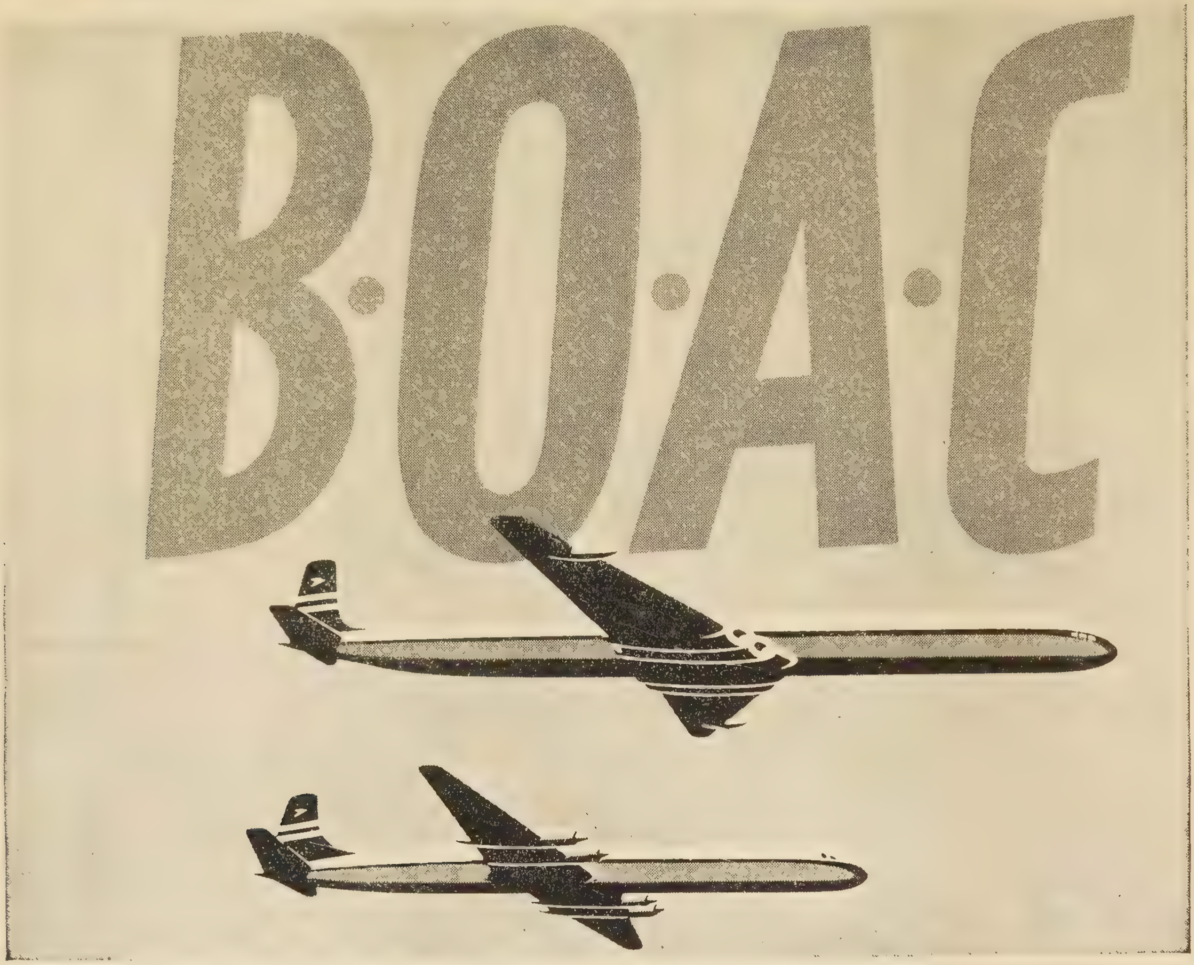
Stock Food

The processing of linseed before use as a stock food is necessary to destroy an enzyme which can produce prussic acid. The heat treatment employed during the extraction of oil has a similar effect. The material left after extraction of linseed oil is useful for stock feeding, though it varies in food value according to the extraction method used. Under the expeller system used in New Zealand the food value of the residue, sold as linseed meal or linseed cake, is high.

Diseases

Rust can cause severe loss in wet seasons and in rank linseed crops.

BOAC streaks ahead still further, in jet travel service, jet travel experience, jet travel leadership.



NOW! REGULAR JET SERVICES ROUND THE WORLD

Now BOAC -- offers superb jet comfort right round the world. Rolls Royce powered Comet 4's speed you between the Far East and Europe. Jet-prop Britannias span the Pacific with the fastest through service between the Far East and Honolulu, San Francisco. and through New York on to Europe. Additional Comet 4's and Jet-prop Britannias provide the finest choice of daily services between U.S.A. or Canada and Europe.

Comet 4 Jetliners now regularly serve Sydney, Singapore, Bangkok. Hong Kong. Tokyo. Rangoon, Colombo, Bombay, Calcutta. New Delhi. Karachi. Bahrein, Teheran, Beirut, Rome, Zurich. Frankfurt. London. New York and Montreal.

BOAC's great global network of Jetliner services is not matched by any other airline. And with the extra speed and comfort of jet smooth BOAC airliners you will enjoy BOAC's unsurpassed personal service

Book by BOAC. You'll arrive gloriously fresh . . . thanks to the difference BOAC jet travel makes.

For full details of Luxury or Low-Fare services through-out the world, see your Travel Agent or TEAL, BOAC's General Agents for New Zealand.

FLY B·O·A·C

The most experienced Jet Airline in the World

NZ2/A

BRITISH OVERSEAS AIRWAYS CORPORATION WITH TEAL, QANTAS, S.A.A. AND C.A.A.

▲ A New Zealand linen flax processing plant with retted flax drying.

Carried over winter by self-sown linseed or wild linseed, the disease is wind spread during summer and can build up rapidly. There is no method of control, so the only hope of avoiding rusted crops is to sow varieties known to be resistant to New Zealand races of rust.

Pasmo is a seed-borne disease characterised by brown stem lesions that may eventually encircle the stem. Crop yields are substantially reduced, but the disease can be controlled by hot water treatment or, less effectively, by mercurial dusting of the seed. Hot water treatment is practicable only with small lots of seed and under carefully controlled conditions.

Browning is the last phase of an organism that can cause seedling blight and stem break. Hot water treatment of the seed will prevent browning.

False browning is a physiological disorder that appears where the soil is shallow, with shingle near the surface, or in waterlogged areas. The straw turns brown and the plant may die.

Wilt is another seed-borne disease in which the plants wilt and die from the top downward in hot, dry weather. It most commonly appears where two or more crops of linseed are grown in succession, as the infection builds up in the soil. Separation of linseed crops by a period in pasture and the use of seed from disease-free crops will prevent wilt from becoming serious.

Seedling blight is observed mainly in thick crops or in patches of heavy seeding. Under warm, moist conditions it can build up rapidly. Organic mercurial thiram, or captan seed treatments will give good control.

LINEN FLAX

By M. L. CAMERON,

Farm Advisory Officer, Department of Agriculture, Timaru

THOUGH the production of vegetable fibre crops is not of major importance to the farming economy of New Zealand, the maintenance of a domestic industry can be justified both by our annual requirements of 250 to 300 tons of flax fibre and the strategic value of vegetable fibres if supplies from overseas become difficult to obtain.

THE commercial production of linen flax, which began as a wartime venture and involved up to 20,000 acres of crop during the war years, is at present restricted to the requirements of one processing factory at Geraldine, South Canterbury.

About 750 acres of the crop are grown each year on contract to the factory and of necessity are located within reasonable cartage distance of it.

The New Zealand crop of linen flax fibre is at present used for the production of seaming twines, ham and other cords, and yarns used in the manufacture of carpets and woolpacks. The most important by-product is seed. Close attention to varietal purity and quality has enabled the industry to satisfy local seed requirements and build up an export trade. Surplus seed is used in the production of linseed oil and linseed meal. The husks of the seed bolls are also ground into meal for use as a stock food. Tow, which consists of the short fibres unsuitable for spinning, is used in the manufacture of underfelt.

Features of Linseed and Linen Flax Growing in New Zealand

Area grown: 10,000 to 20,000 acres of linseed; 750 acres of linen flax

Main growing district: Linseed in Canterbury; linen flax in Geraldine district, South Canterbury

Most suitable soils: Medium to low fertility soils with adequate and uniform moisture supply

Varieties: Linseed—Golden Viking, Marine, and others; linen flax—Weira

Normal sowing rates
- Seed—Linseed, 50 lb; linen flax, 85 lb
- Fertiliser—Linseed, 1 cwt of superphosphate; linen flax, nil

Normal sowing period: October

Average yields: Linseed—10 to 12 cwt of seed; linen flax—5 cwt of linen fibre

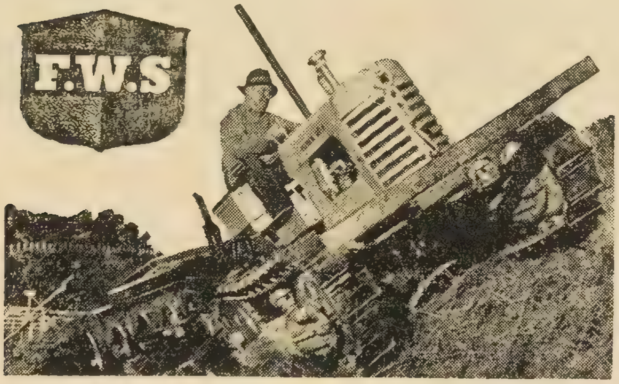
Soil and Climate Requirements

The linen flax crop requires, above everything else, uniform growing conditions, as any growth checks are directly reflected in lower fibre quality. It is suited to areas where summer showers maintain a uniform moisture supply or where the soils are sufficiently moisture retentive to counteract periods of low rainfall. Generally medium to low fertility soils are preferable, since under high fertility conditions the crop tends to lodge and produce a coarse, harsh fibre. For

FOR MATCHLESS PERFORMANCE IN DIFFICULT COUNTRY

—It's the sturdy, reliable, sure-footed Oliver OC-4

THE CRAWLER WITH THE OUTSTANDING SAFETY RECORD



A crawler tractor for all work on difficult country, Oliver OC-4 has unusually wide gauge and high clearance suiting it particularly to the hill country farmer . . . for ploughing, discing, harrowing; or, with the addition of a dozer blade, for cutting scrub or farm tracks or clearing water tables. A mounted fertiliser spreader with three-point linkage can be supplied for the OC-4. The best crawler buy, the OC-4 has an outstanding safety record in N.Z.

Sole New Zealand Distributors:

FREDERIC W. SMITH LTD.

18-20 Frost Road, Mt. Roskill, Auckland.
206 Thorndon Quay, Wellington.
148 Carlyle Street, Christchurch.

There's one of my banks . . . the other's the **A.N.Z.**

In one sense, any farmer worth his salt will agree that putting profits back into the land is the best kind of banking. But of course, farm finance is a great deal more complex than that. For all the day-to-day transactions involved in the successful management of a farm as well as for long term finance you would have to go far to find more accumulated knowledge and experience, more friendly personal attention, than that always available to you at your local branch of A.N.Z. Bank.

A·N·Z

A.N.Z. BANK

AUSTRALIA AND NEW ZEALAND BANK LIMITED

ANZA.$\frac{1}{2}$

these reasons linen flax growing is confined largely to the damp and wet yellow grey earths (silt loams formed from wind-blown loess) which have a moisture-retentive subsoil and an annual rainfall of 20 to 30 in.

Place in Rotation

Linen flax is usually grown out of lea. If the fertility of the land is high, it is desirable to precede the flax crop with one or more cereal crops. Flax should not be grown after brassica crops, since the feeding off of these crops produces high nitrogen levels which result in heavy crops of linen flax low in quality and fibre yield. A long period should elapse between flax crops to prevent a build-up of disease organisms.

Land Preparation

Land preparation should begin early in winter to produce the firm, well consolidated seedbed necessary for even germination and growth. Early-winter top working followed by deep ploughing in early spring assists in the decomposition of the turf and the consolidation of the seedbed. Final working to an even, fine state can be done just before sowing. Where the land is subject to surface erosion or is poorly drained it is usual to dispense with early topworking and plough in late winter, thus producing a seedbed which, though rubbly and less consolidated, has proved satisfactory.

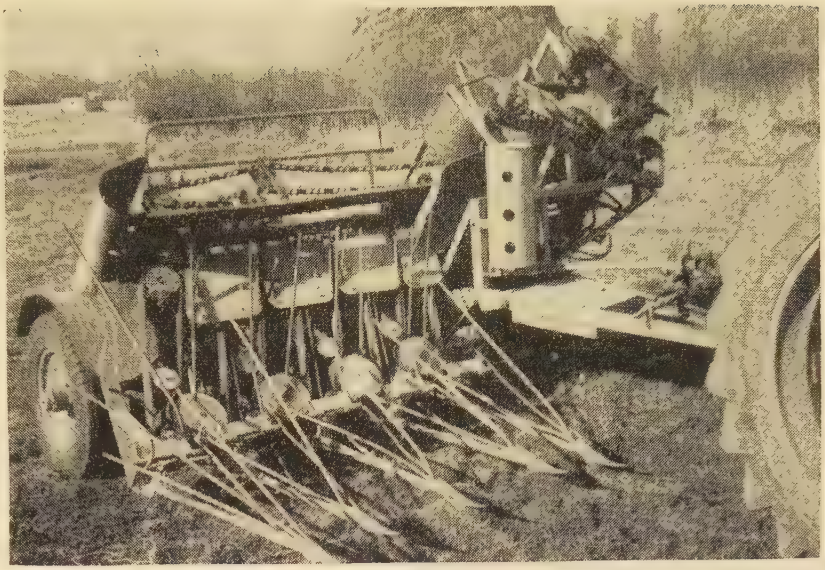
Varieties and Yields

The most important factors to be considered in selecting linen flax varieties are: fibre yield, fibre quality, resistance to lodging, and resistance to disease. In New Zealand the number of varieties in commercial use has been limited as much as possible to maintain varietal purity.

The standard variety, until recently, was Liral Crown. This gives satisfactory seed and fibre yields and is relatively resistant to lodging, but is susceptible to rust. It is an early maturing variety and will tolerate adverse weather at harvest.

Today Liral Crown has been replaced by a new variety, Weira. This variety has proved to be outstandingly resistant to lodging and the effects of adverse harvest weather. It has a high fibre yield but the fibre is not as soft as that of Liral Crown. In susceptibility to rust infection it is equal to Liral Crown, but it is more susceptible to "browning". No pasmo disease has yet been observed in crops of Weira.

Rust infection is one of the major hazards in flax growing, and for this reason the Crop Research Division has bred a rust-resistant variety, seed of which was available for field trials in the 1958-59 season. This variety, known as Blue Blossom, Rust Resistant, is resistant to all races of rust known to occur in New Zealand. No information is yet available as to its yield or resistance to lodging.



The latest flax pullers can handle 1 acre per hour in an average crop, about double the capacity of older-type pullers.

Yields of flax fibre, both fibre percentage and fibre yield per acre, can vary widely, but generally recent crops have averaged about 10 per cent of fibre, giving a yield of about 5 cwt of fibre per acre.

Sowing

The crop is normally sown in October, the soil then being warm enough to ensure rapid and even germination. The seed should be drilled ½ to ¾ in. deep at 80 to 90 lb per acre. Higher seeding rates greatly increase the risk of lodging. It is advisable to drill the crop with 3½ in. centre coulters, as these give a more uniform spread of the seed, thus ensuring an even crop of quality fibre.

Fertilisers

No advantage is to be gained from the sowing of fertiliser with the crop. Though phosphatic fertiliser may increase the seed yield, it does not increase the yield or quality of the fibre. Lime should not be applied directly to the crop, as it tends to make the fibre harsh and brittle. Where the soil is very acid it is advantageous to apply lime to the preceding crop or pasture.

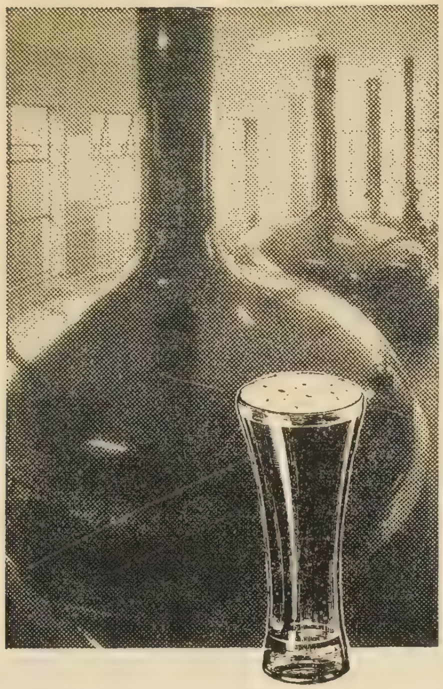
Harvesting

Linen flax is usually ready for pulling in 100 days, though this period can vary from 90 to 130 days, depending on the climate. Flowering begins about nine weeks after sowing and pulling can begin five weeks later when the stem begins to yellow and the bottom leaves fall. Early harvesting results in better fibre quality, but later harvesting makes for easier handling and higher fibre and seed yields. Since the crop is valued on a fibre yield and quality basis and strength of fibre is most important in the production of cords and twines, harvesting at the correct time is very desirable. Heavy rain at harvesting may prevent the stem from ripening normally, this condition resulting in a lowering of fibre quality. If this condition exists, fitness for harvesting should be judged by the ripeness of the seed bolls.

In New Zealand crops are harvested by pulling the plants out of the ground. The machines used for this purpose grip the flax between belts travelling on an inclined plane and tie it into sheaves. The aim is to produce evenly butted sheaves of such a size that they will dry out uniformly. Care must be taken not to damage the fibre through too tight an adjustment of the belts on the puller or by tight bands on the sheaves. Damage of this nature is more likely to occur if the crop is immature. The crop is usually left for one or two days before stooking in the paddock. Usually the crop is fit for stacking in 10 to 14 days, though weather conditions may cause some delay. The crop is then transported on trailers to the factory for weighing, sampling, and stacking.

Diseases

The diseases of linen flax are the same as those attacking linseed, and control methods are similar.



A GLASS OF ALE & CONTOUR PIPE

You could be excused for not connecting Contour Pipe with this pleasurable drink . . . but connected they are. The quality and flavour are the result of brewing techniques made possible by the use of Contour pipe. Contour Pipe, is used to convey chilled water for brewing, and sodium chlorate for controlling the temperature of the vats. In these services Contour Pipe has achieved a performance and maintenance record that far exceeds any previous system. Contour Pipe's amazing range of applications is considerably broadened by the availability of two distinct types . . . Normal Pressure and High Pressure. Contour Pipe is the only polythene pipe to combine Mirror Finish — Stress Free Strength —and Smooth Bore. For both farming and industrial uses Contour Pipe provides ease of installation, trouble-free service, and cost savings.

CONTOUR PIPE

CONTOUR CONTOUR REGD TRADE MARK

LOOK FOR THE NAME CONTOUR AND IDENTIFYING STRIPES, RED FOR NORMAL PRESSURE, WHITE FOR HIGH PRESSURE

Contour Pipe is Unconditionally Guaranteed—Always has been

Contour Pipe is manufactured to the rigid British Standard Specification and carries a guarantee that it will not wear out — weather and soil conditions cannot crack it — recommended pressures won't burst it — recommended chemicals won't harm it — it will not rot, rust or corrode. Contour Pipe meets the exacting tolerances required in pipe of this kind necessary for use with Fusion Fittings.

"Garnite" and "Contour Pipe" are the registered trade names of A.C.I. Plastics Pty. Ltd., Penrose, Auckland.

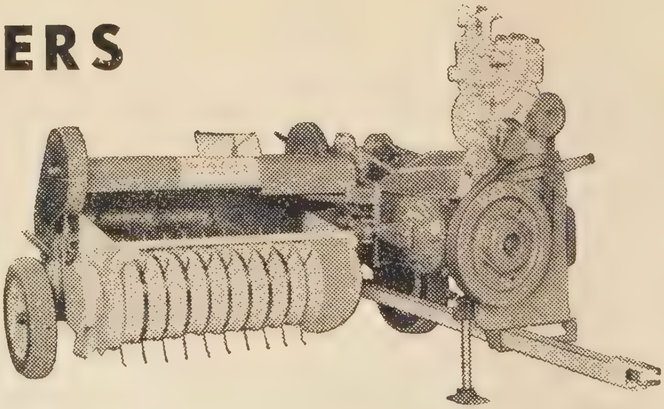
Sole selling agents: Neill, Cropper & Co. Ltd., P.O. Box 9, Auckland: P.O. Box 583, Wellington: P.O. Box 1378, Christchurch: P.O. Box 703, Dunedin.
AK2272

Bisley's
BETTER Farm MACHINERY

RECOMMEND LONG 48
AUTOMATIC

PICK-UP BALERS

Renowned for reliability and high output, Long Balers produce the best backed bale. Suitable for hay, straw or silage, with automatic even tension on each bale.



LONG 48 FOR
FASTER, BETTER BALING
AND MINIMUM MAINTENANCE

A. M. BISLEY & CO. LTD.

WARD ST., HAMILTON - ANTIGUA ST., CHRISTCHURCH

Branches at: TE AWAMUTU, MORRINSVILLE, TE PUKE, WHAKATANE, ROTORUA and TIMARU.

DISTRIBUTORS IN ALL MAIN TOWNS.

A. M. BISLEY & CO. LTD.,
Box 487, Hamilton.
Box 573, Christchurch,
Please send me details of your:—
Pick-up Balers.

NAME ....
ADDRESS ....
.... J.AG.

PHENOLS CONTROL

Mossy Growths on Roofs and Lawns

MOSS and liverworts (collectively known as bryophytes) often cover tiled roofs, concrete footpaths, and fences. Some species (such as *Tortula murose*) are attracted by the high alkalinity of concrete mixes. Lichens and one or more species of fungus are likely to occur on slates and materials made from asbestos. Infestations of these plants can be controlled by chlorinated phenols at rates up to 8 lb per acre (about 1 oz per 30 sq. yd.).

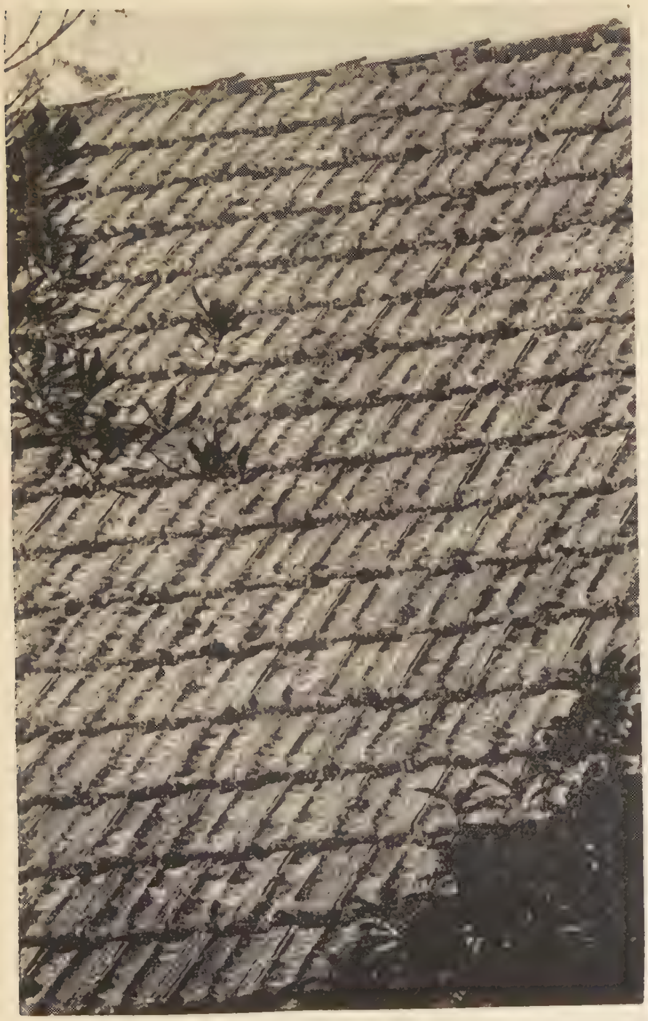
PHENOLS are more effective in hot rather than cool weather and rain falling within a day or so of application is likely to affect results.

The most suitable type of phenol preparation is the sodium salt of pentachlorophenate available under the proprietary names of "Phenosap", "Stantox Moss Killer", "Shell Weedkiller Q", and "Santobrite". "Santobrite" is a powder and has to be dissolved according to maker's instructions before application. The other materials should be added to water according to instructions and applied by spraying.

The sodium salt of pentachlorophenate is slightly poisonous and should not be used where there is risk of contaminating drinking water.

A further use of the materials is for moss and liverwort control in lawns and playing greens. Lawns that are shaded or unthrifty tend to be infested with a number of different bryophytes such as *Brachythecium albicans, Ceratodon purpureus,* and *Lophocolea heterophylloides.* Though sodium pentachlorophenate will kill the existing bryophytes, unless thrift of the lawn or playing green is improved, reinfestation will quickly occur.

Untreated Roof



Treated Roof

Survey of Subtropical Fruit Orchards

By W. A. FLETCHER,
Horticultural Advisory Officer (Citriculture),
Department of Agriculture, Auckland

MANY kinds of subtropical fruits have been introduced into New Zealand, but the only ones which are being produced on a relatively large commercial scale at present are Chinese gooseberries (*Actinidia chinensis*), feijoas (*Feijoa sellowiana*), passionfruit (*Passiflora edulis*), and tree tomatoes (*Cyphomandra betacea*). In recent years a small commercial orchard of avocados has been developed at Gisborne. Plantations of the four main subtropical fruits mentioned were included in a survey of New Zealand's fruit growing industry carried out by Horticulture Division officers during the autumn and winter of 1958.

A FEW of the properties surveyed are devoted to the production of subtropical fruits alone, but these fruits are grown mainly in conjunction with citrus at Kerikeri, Auckland, Tauranga, and Te Puke. Recording was restricted to plantations with at least 50 subtropical fruit plants. Where any of the four principal fruits comprised only part of an orchard being recorded, 10 Chinese gooseberry vines and 25 plants of any one of the other subtropical fruits were the smallest numbers recorded. Plant condition was recorded for Chinese gooseberries only.

Production in 1958

Production of subtropical fruits in 1958 (1,200 tons) was only slightly less than the record crop obtained in the previous year.

Tree tomatoes: Production was estimated at 713 tons, which is more than 100 tons less than in the previous year. The lower yield was due in the main to poor setting of fruit in the Bay of Plenty caused by cool, dry weather during the spring and early summer.

Chinese gooseberries: Production was estimated at 353 tons, a considerable increase on the previous year as a result of many young vines coming into bearing.

Passionfruit and feijoas: Production remained more or less static at about 94 tons and 28 tons respectively.

Planting Trends and Outlook

Between the 1953 and 1958 orchard surveys the number of Chinese gooseberry vines has increased by 30 per cent and tree tomato plants by 54 per cent. The overall area in passionfruit has remained unchanged, but plantings have now become concentrated in the Bay of Plenty and production has increased because of better yields per acre in that district. The area in feijoas has decreased by 15 per cent, but there has been little change in production.

As long as present good prices for tree tomatoes are maintained the trend to increase plantings is likely to continue. More than 13,000 new trees (not recorded in the survey) were planted during the year. Yields of tree tomatoes can be markedly affected by frosts and other vagaries of the weather, but once Kerikeri plantations recover from damage caused by a tropical cyclone last March, Dominion production could again increase to more than 800 tons within 2 or 3 years.

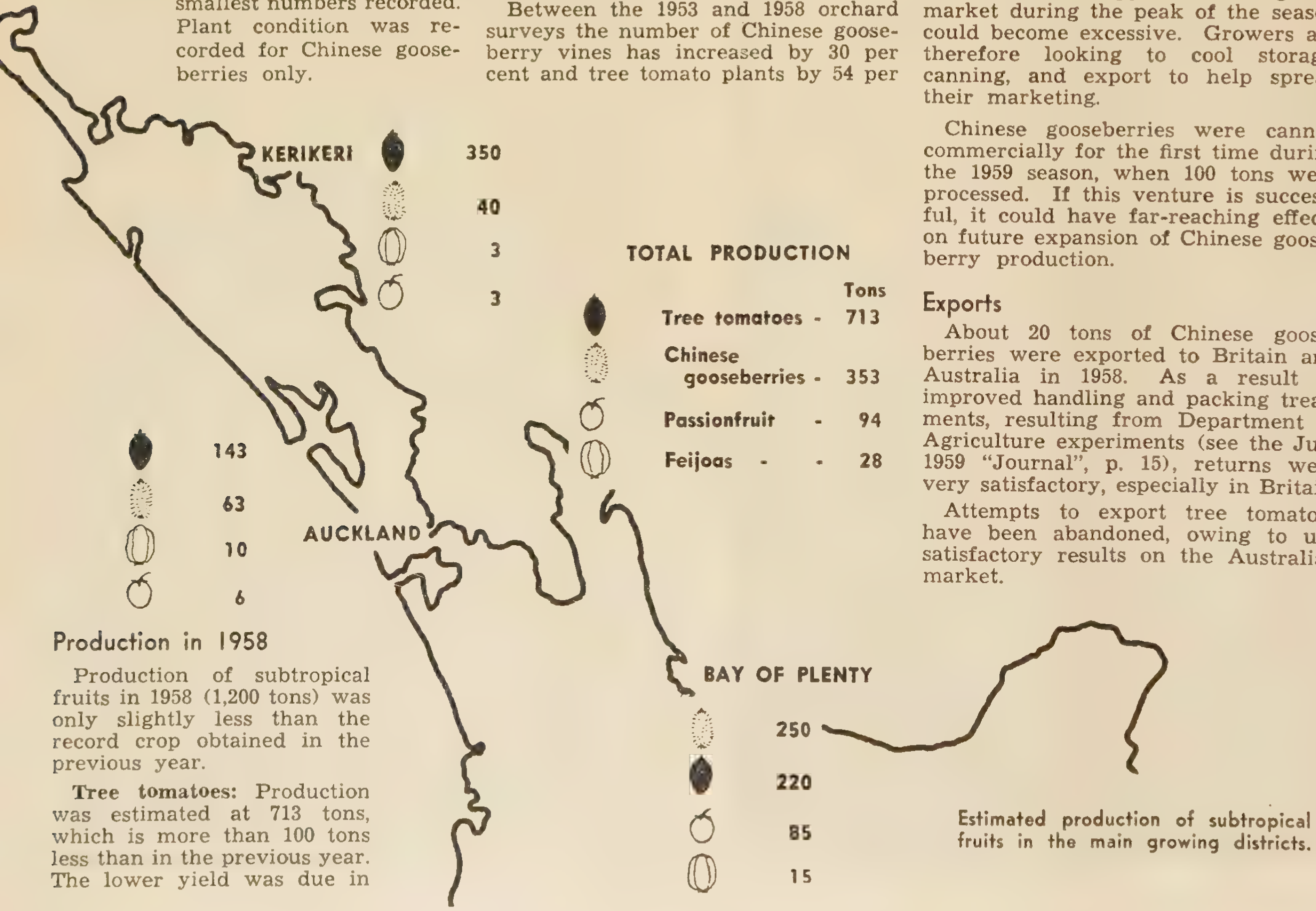
There was a marked decline in the rate of planting Chinese gooseberries during the year, possibly because of an increasing awareness of the danger of over-production. Nevertheless, as many young vines come into bearing, production is likely to increase steeply over the next few years to about 500 tons and supplies reaching the market during the peak of the season could become excessive. Growers are therefore looking to cool storage, canning, and export to help spread their marketing.

Chinese gooseberries were canned commercially for the first time during the 1959 season, when 100 tons were processed. If this venture is successful, it could have far-reaching effects on future expansion of Chinese gooseberry production.

Exports

About 20 tons of Chinese gooseberries were exported to Britain and Australia in 1958. As a result of improved handling and packing treatments, resulting from Department of Agriculture experiments (see the July 1959 "Journal", p. 15), returns were very satisfactory, especially in Britain.

Attempts to export tree tomatoes have been abandoned, owing to unsatisfactory results on the Australian market.



TOTAL PRODUCTION

	Tons
Tree tomatoes -	713
Chinese gooseberries -	353
Passionfruit -	94
Feijoas -	28

Estimated production of subtropical fruits in the main growing districts.

Leatherjacket Damage to Cocksfoot Stands

By A. R. RANKIN,
Fields Instructor,
Department of Agriculture,
Invercargill

LAST spring there were three recorded instances of leatherjackets attacking cocksfoot seed stands in Southland. Damage was so severe in two stands that they were subsequently ploughed up. One was only two years old, so that the economic loss was high. This article describes the damage and the results of the attack.

LITTLE is known of the life cycle and feeding habits of leatherjackets. They are grey, much wrinkled grubs up to $\frac{3}{4}$ in. long when fully grown and are always found in the soil. They are without legs or any distinct head. Pupation occurs in the soil and when the adult is about to emerge the pupa wriggles to the surface and projects some distance out of it. The adult is a two winged fly commonly known as a crane fly or daddy longlegs.

The insects prefer damp situations, the grubs being often found in soil among the roots of plants on which they are suspected of feeding. Many species of leatherjackets feed on decaying organic matter and apparently there is doubt about whether or not they cause significant damage to plants.

Leatherjackets are the larvae of the crane fly and are dirty looking, dark grey, plump, and slow moving.

Severe Damage

However, two instances of severe damage and one of minor damage to cocksfoot attributed to this insect have recently been recorded in the East Limehills district in Southland.

The district is noted for its production of timothy seed and though several areas are saved for cocksfoot seed, the country tends to be wetter than normal for cocksfoot seed growing. The three areas attacked were all reasonably close together.

Damage in each appeared to begin in the damper hollows and runners and spread outward in roughly circular patches. The cocksfoot became greyish and bleached, with no sign of green shoots.

The crane fly, the adult form of the leatherjacket. It is also known as daddy longlegs because of its very long, brittle legs.

The plants were easily removed, indicating severe root damage. As these were seed stands, the cocksfoot plants were clumpy, and under normal circumstances considerable force would be required to pull them from the ground.

There was a high population of leatherjackets in the soil, and where the damage was severe the covering vegetation could be scraped away from the soil.

Contributing Factors

Two factors are thought to have contributed to the high population of leatherjackets. Firstly, cocksfoot seed stands provide considerable quantities of litter in the form of decaying and dying leaf material. Based on present knowledge this would provide excellent cover and feed for the grubs. Secondly, the combination of this food supply with damp conditions has contributed to the incidence of this pest. However, in all three cases the grub in addition to feeding on the decaying litter and leafage, has apparently turned to the cocksfoot roots, with disastrous results.

Two of the stands were so badly attacked that they were ploughed in. In the third the farmer, noticing the damage reasonably early, applied DDT superphosphate and this markedly arrested the spread of the damage. In addition a recent inspection has shown that though the cocksfoot population has been reduced in the affected areas, young shoots are emerging from a number of apparently dead plants. While it would seem that DDT provided an effective means of control in this instance, the possibility of more effective control with other insecticides must not be overlooked. DDT, the only insecticide tried yet, has, however, provided efficient control.

New Reidrubber 'DE LUXE' TREAD

Reidrubber
B.F. Goodrich

BETTER TRACTION

LONGER MILEAGE

SILENT RUNNING

RC9 - 3B

DESIGNED FOR PEAK PERFORMANCE
ON YOUR CAR

You drive trouble-free on this latest B. F. Goodrich tread pattern. You get better traction and longer mileage—and this tread is silent-running. Reidrubber 'De Luxe' tread comes smiling through every rugged test—you can count on it for

Smileage!

FOR HAPPY MOTORING !

---

it's easy to see

it's a Vacmark brand!

Vacmark
Sheep Branding Fluid
BLACK

Long - lasting !
Scours Out Completely !
No Stain or Damage to Wool !

You'll get your branding done the quicker, easier, more successful way if you brand with economical VACMARK. Four clear, bright colours—approved as a Wool-marking preparation under the Stock Act 1908 and its amendments—give you legible markings that really last . . . yet they wash out with no trouble in scouring operations. No staining, no damage to the wool either—with VACMARK. *Available from all stock and station agents. Order yours now!*

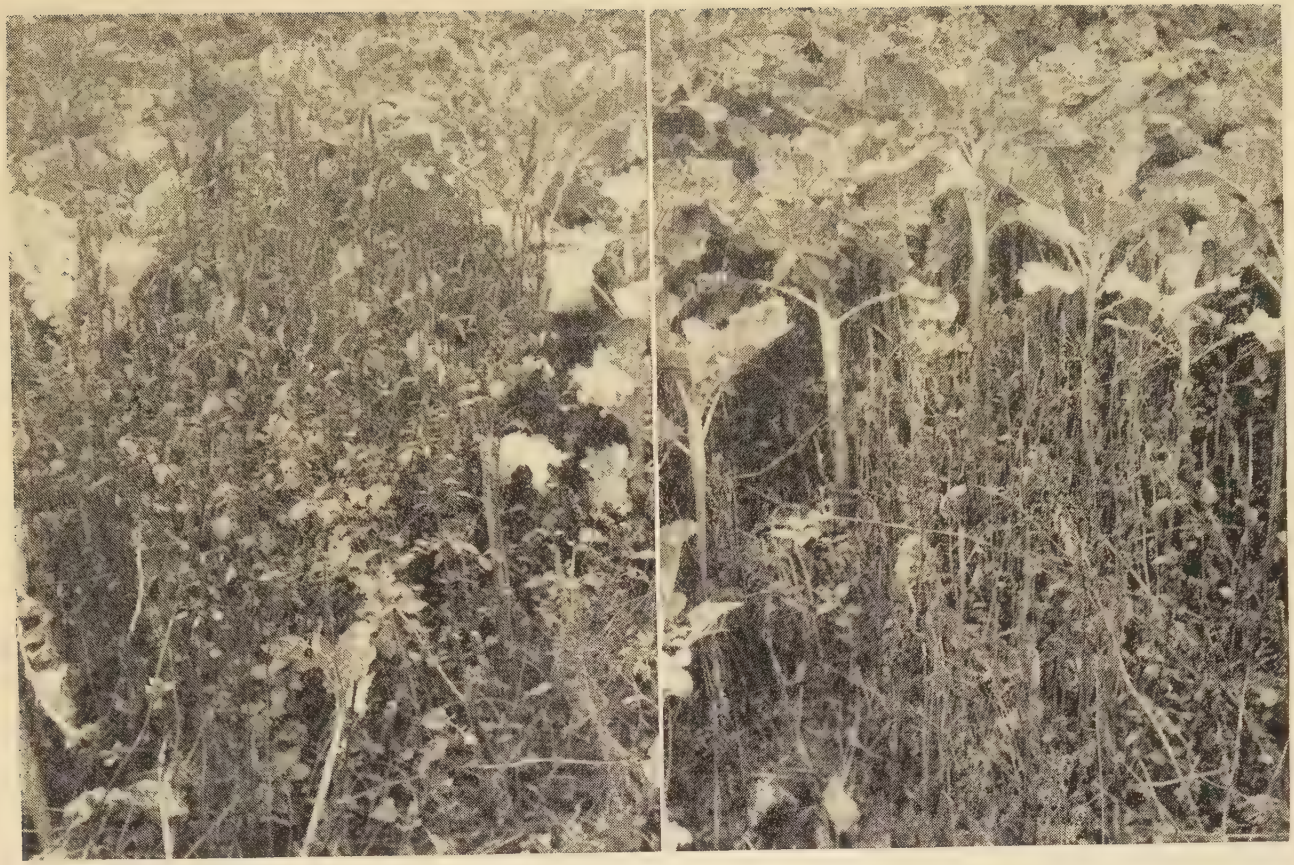
BRAND WITH

Mobil
Quality Products

Vacmark

the finest Quality Sheep Branding Fluid in N.Z.

STANDARD - VACUUM OIL COMPANY (N.Z.) LTD.



Left—Crop sprayed when 18 in. high with 20 lb of MCA in 20 gallons of water, showing area of redroot missed. Right—Same crop showing killed redroot revealed by removing chou moellier plants in foreground.

Redroot in Chou Moellier Controlled with MCA

By H. McM. BULL,

Farm Advisory Officer, Department of Agriculture, Auckland

COMPETITION from weeds, especially redroot (*Amaranthus* species) and redshank or willow weed (*Polygonum persicaria*), has always been severe in much cultivated land. In fact, the growth of these weeds, especially redroot, has become so dense and vigorous in some areas that summer cropping can no longer be carried on. The illustrations show the success that can be achieved in a crop of chou moellier overrun with redroot from one application of a new weedkiller called MCA (sodium salt of monochloroacetate), which is available commercially as "Monoxone" and "Stantox MCA".

IN the application of this material the spray boom is raised to its extremity and the tractor is driven slowly to ensure good coverage. On the crop illustrated MCA was applied at 20 lb in 20 gallons of water per acre when the crop was about 18 in. high and was being steadily smothered through the formation of a dense canopy above it by the faster growing redroot. Good results have been obtained where the crop is even up to 3 ft high, but spraying then has to be done with a knapsack outfit (over small areas) or by aeroplane (over large areas) to get good cover and to avoid crop damage with ground machinery.

Complete coverage is essential, as MCA is a contact weedkiller and is not translocated. For this reason spraying when the weed is ahead of the crop is recommended. If the crop is ahead of the weed, its leaves will protect the weed seedlings, allowing them to bolt away at some later stage. When both crop and weeds are competing at a young and tender stage and the weed is well exposed, the rate could well be reduced from 20 lb to 15 lb per acre.

Kale, rape, and swedes can also be sprayed with the material. Precautions should be taken not to spray if heavy rain is likely to fall within 12 hours and to avoid spray drift on to neighbouring crops. MCA appears to be very palatable to stock, which will eat large quantities and become ill if no precautions are taken. Therefore, stock should be kept away from any drums and solutions of MCA and from recently sprayed areas for four weeks.

MARATHON GUMBOOTS

by SKELLERUP

SIR EDMUND HILLARY

The Most Durable and Hardest Wearing Gumboots You can Buy!!

Recommended and used by SIR EDMUND HILLARY who says:

"Marathon Gumboots were standard issue to members of the recent New Zealand Trans-Antarctic Expedition. They were given a thorough testing under all types of rigorous conditions and I have no hesitation in paying tribute to their excellent quality, design and durability."

THE ONLY N.Z. MADE GUMBOOT WITH THE EXTRA REINFORCING!

Made on a last specially designed for New Zealand feet, these superior quality gumboots are built—layer by layer by 38 separate processes—to the most exacting standards. Up to six plys of extra reinforcing are built into every boot for greater protection. In Marathon Gumboots these extra reinforcements can be recognised by the raised outlines running round the boot. These are *genuine* reinforcements and NOT simply thicker rubber—they are your guarantee of extra protection. Built for years of hard wear and supreme comfort—Marathon Gumboots are snug fitting yet easy to take off—they will serve you well.

THESE LINES MEAN SOMETHING

On a Marathon Gumboot these lines mean something more than thicker rubber—they mean EXTRA reinforcement built in to strengthen the boot where required.

MARATHON *Gumboots*

By SKELLERUP

Made in New Zealand.

IF IT'S MADE BY SKELLERUP IT'S EQUIVALENT TO THE BEST THE WORLD CAN OFFER

J.AG.8 59

Trends in Livestock Numbers by Land Districts in N.Z.

By J. V. WHITE,
Rural Economist, Department of Agriculture, Wellington

BECAUSE New Zealand's farming is based on livestock, production levels cannot change rapidly. It takes several years to implement a decision to increase, for example, dairy cow or beef cattle numbers. Production trends should therefore be studied over a fairly long period and should cover basic livestock such as breeding stock.

WITH the publication of the farm production statistics for 1958 it is now possible to cover a ten-year period from 1948 to 1958. By 1948 there was beginning to be a fair measure of recovery from the worst effects of the war and of the very dry season in 1945-46. Between 1948 and 1958 there were, on the whole, no factors seriously retarding farm production. Supplies of fertilisers, machinery, and other requisites of production were reasonably adequate, prices for produce were satisfactory to excellent, and most farmers had some surplus to invest in land development. This applied more particularly to sheep-farming than dairying, but there was a great deal of improvement work on dairy farms as well.

Table 1 shows changes in the main classes of stock by land districts over the period. The North and South Islands have been totalled separately for comparison.

The following points are of major interest:

1. The North Island contains the great bulk of New Zealand's livestock population, having rather more sheep than the South Island and the greater part of the cattle population.

2. Dairying is declining in the South Island, the number of cows in milk having gone down by 4.7 per cent. Southland was largely responsible for this, concentration being on fat lamb production.

3. While there has been an increase in total cattle numbers in both islands, the rate in each has been less than the rate of increase in sheep numbers.

4. While there has been an increase in dairy cattle in the North Island, it has been much less than the rate of increase in sheep numbers. The traditionally dairying district of South Auckland has the biggest rate of increase in sheep numbers. In both North and South Auckland increased carrying capacity has been taken up with sheep rather than dairy cows.

5. In the three traditionally sheep-farming districts of Gisborne, Hawke's Bay, and Wellington the rate of increase is rather disappointing. The lack of movement in dairy cow numbers in Gisborne and Wellington and the sharp decline in Hawke's Bay could be expected, but the rate of increase in sheep numbers is much less than in North or South Auckland or the major sheep districts of the South Island. It is likely that the full effects of aerial topdressing have yet to be felt in these areas.

TABLE 1—LIVESTOCK NUMBERS 1948 AND 1958 (nearest 000)

	Cows in milk			Total cattle			Breeding ewes			Total sheep		
Land district	1948	1958	Per cent change	1948	1958	Per cent change	1948	1958	Per cent change	1948	1958	Per cent change
North Auckland ..	375.1	444.1	18.40	779.5	960.7	23.24	752.9	1,352.6	79.65	1,178.4	2,031.2	72.37
South Auckland ..	608.1	767.6	26.23	1,252.7	1,742.6	39.11	2,285.0	4,091.7	79.07	3,291.3	5,959.3	81.06
Gisborne	40.8	41.8	0.24	358.0	417.3	16.56	1,236.9	1,362.1	10.12	2,162.8	2,255.3	4.28
Hawke's Bay ..	60.0	44.7	—24.50	396.2	535.1	35.06	2,792.1	3,554.2	27.29	4,289.3	5,358.2	24.92
Taranaki	221.9	258.0	16.27	409.7	462.1	12.79	592.1	728.4	39.91	920.6	1,054.3	14.52
Wellington	214.6	217.8	0.15	862.1	982.0	13.91	4,207.0	5,332.1	26.74	6,653.1	8,389.5	26.10
North Island ..	1,520.5	1,773.9	16.67	4,058.2	5,099.9	25.67	11,866.0	16,421.1	38.39	18,495.5	25,047.8	35.43
Marlborough ..	13.1	13.9	6.11	53.3	71.8	34.71	597.5	783.5	31.13	1,048.7	1,285.1	22.54
Nelson	31.9	35.0	9.72	76.1	87.7	15.24	253.5	337.7	33.21	436.4	541.7	24.13
Westland	12.6	14.9	18.25	48.3	57.7	19.46	56.3	96.1	70.69	73.5	123.7	6.83
Canterbury ..	61.4	64.2	4.56	205.4	269.0	30.96	3,548.0	5,687.1	60.29	5,196.9	8,064.6	55.18
Otago	34.8	28.8	—17.24	126.1	146.2	15.94	2,366.9	3,648.5	54.15	3,872.6	5,644.4	45.75
Southland	48.3	35.6	—26.29	148.8	153.5	3.16	2,637.1	3,901.7	47.95	3,359.6	5,318.6	58.31
South Island ..	202.1	192.6	—4.70	658.0	785.7	19.41	9,459.3	14,454.6	52.81	13,987.7	20,978.1	49.98
New Zealand ..	1,722.6	1,966.5	14.16	4,716.2	5,885.6	24.80	21,325.3	30,875.7	44.78	32,483.2	46,025.9	41.69

Source: Farm Production Statistics and Annual Sheep Returns. Sheep figures for 1948 are as at 30 April and for 1958 as at 30 June.

TABLE 2—LIVESTOCK POPULATION IN TERMS OF LIVESTOCK UNITS (nearest 000)

	1948		1958		
Land district	Number of units	Per cent of total	Number of units	Per cent of total	Increase 1948 to 1958
North Auckland	778.2	9.28	1,048.8	9.27	34.77
South Auckland	1,475.1	17.59	2,242.3	19.82	52.01
Gisborne	558.6	6.66	616.2	5.45	10.31
Hawke's Bay	913.6	10.90	1,165.8	10.30	27.60
Taranaki	465.0	5.55	531.8	4.70	14.36
Wellington	1,600.6	19.09	1,942.0	17.16	21.33
North Island	5,791.2	69.06	7,546.9	66.69	30.32
Marlborough	193.1	2.30	242.4	2.14	25.50
Nelson	121.7	1.45	147.1	1.30	20.82
Westland	44.7	0.53	59.6	0.53	33.17
Canterbury	940.6	11.22	1,429.6	12.63	51.99
Otago	669.1	7.98	956.4	8.45	42.93
Southland	624.9	7.45	933.9	8.25	49.44
South Island	2,594.1	30.94	3,768.8	33.31	45.28
New Zealand	8,385.3	100.00	11,315.7	100.00	34.95

6. The rate of increase in sheep numbers, and still more in breeding ewes, is greater in the South Island than in the North. This is a reflection of concentration on the fat lamb industry.

7. The major sheep districts of the South Island, Canterbury, Otago, and Southland, show a heavy rate of increase, the most spectacular being Canterbury, which has more than held its own in relation to Southland and which now challenges Wellington for top position for sheep numbers.

Comparison of Total Carrying Capacity

The mixed livestock population and uneven distribution of cattle throughout the country make direct comparisons possible only on the basis of stock units. A stock unit is a statistical convention to bring all types, ages, and classes of livestock to a common denominator. The more usual standard is the cow in milk, equivalent to one livestock unit, with other classes of stock assessed on the basis of their feed requirements relative to that of a cow in milk.

On this basis the position is shown in Table 2, the most salient point in which is the predominance of the North Island in our livestock farming and hence in our export trade.

It is probably no accident that the percentage distribution of livestock units between the two islands is about the same as the percentage distribution of human population. Where money is earned by exports a demand is created for goods and services which naturally tends to build up population in those areas.

The type of farming returning the highest gross revenue per unit of land in overseas funds is dairying, which, even at prices more modest than those ruling in September 1959 (time of writing), yields about £40 per acre on reasonably good dairying land. This is higher than even the more intensive types of fat lamb farming, and higher than the returns from average wheat land yielding 50 bushels per acre. Furthermore, it is a permanent level of return (assuming constant prices), while wheat land has to be spelled.

If there is a moral to these figures, it is that North Island livestock farming is more versatile than that of the South Island. The South Island's rapid expansion in recent years after a deplorably long static period must be gratifying to all those extension workers and others who, years ago, saw the potential of South Island sheepfarming and strove to achieve concrete results from it.

At the same time, consideration must be given to the possible consequences of too great a dependence on one product which, whatever its quality and delectability, is still a luxury to the vast majority of the world's population.

◆

Surface Drainage and Graded Drainage Banks

THOUGH surface drainage must be considered a compromise in that it offers few of the benefits of complete underdrainage, there are occasions where its use is justified.

In parts of the Auckland Province and elsewhere in New Zealand there are large areas of marine flats where the action of the tide makes the provision of satisfactory gravity outlets impossible. Here properly installed surface drainage can give considerable improvement for a reasonable outlay.

In this situation surface drainage should consist of a series of ridges and hollows with about 10 to 11 yds between the crests of the ridges. The drains are best installed by first ploughing in lands of 10 to 11 yds and subsequently grading, preferably with a road grader, to give a constant fall from the crest of the ridge to the bottom of the hollows. Where possible the drains should run with the fall and where surface fall is very limited a little can be gained by deepening the hollows toward their outlets. For maximum efficiency surface drainage should be planned so that channels are not longer than about 6 chains.

Early cultivation is important to obtain complete decomposition of turf and root material; otherwise this tends to be collected along the crests of the ridges, making clover establishment difficult there and the subsequent consolidation tends to flatten off the ridges. The finished drains in level are roughly a foot between the top of the ridge and the bottom of the hollow. This slope from ridge to hollow encourages rapid run-off and reduces absorption of moisture into the soil. Though the bottoms of the hollows tend to remain wet and may even grow rushes in time, the improvement to the rest of the paddock greatly outweighs this disadvantage.

Though the surface drains described are generally confined to flat areas, a series of shallow graded furrows can be used on rolling country to intercept run-off and take off surface water.

This method is advisable only where underdrainage cannot be used. These banks will reduce the amount of surface water reaching the lower slopes of a hill or the flats below a hill. Banks or furrows are installed with a constant grade, usually not greater than 1 in 30 or less than about 1 in 80. They can be made with a swamp plough, grader blade, or road grader, and the system must be planned so that they discharge into a well grassed gully or similar outlet which can carry away the accumulation of water without the danger of erosion.

Surface drains of this type look rather like the banks and furrows used in soil conservation works to reduce run-off and conserve moisture in arid areas. The main difference is that with the drainage channels the fall is steeper, allowing more rapid run-off of water.

—D. F. SCOTT,

Fields Instructor,
Department of Agriculture,
Auckland

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during August 1959 with comparative figures for the same month of 1958 have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:

BUTTER

Period	Creamery (tons)	Whey (tons)	Total (tons)	Percentage inc. or dec.
August 1959	10,536	134	10,670	—
August 1958	11,420	106	11,526	—
Increase or decrease	—884	+28	—856	—7.426

Butter in store at 31 August 1959 was 5,680 tons

CHEESE

Period	White (tons)	Coloured (tons)	Total (tons)	Percentage inc. or dec.
August 1959	1,926	56	1,982	—
August 1958	1,420	37	1,457	—
Increase or decrease	+506	+19	+525	+36.033

Cheese in store at 31 August 1959 was 4,589 tons

If these figures are converted into butterfat equivalent, there is a decrease of 5.086 per cent in butterfat graded for August as compared with the same month the preceding season. The above figures refer only to butter and cheese graded for export, and owing to diversions which may take place they are not necessarily a true indication of production trends.

Control of *Didymella* Stem Rot of Tomatoes

By H. C. SMITH, Mycologist, Plant Diseases Division, Department of Scientific and Industrial Research, Lincoln, and L. C. HURNDELL, Horticultural Instructor, Department of Agriculture, Christchurch

DIDYMELLA lycopersici stem rot of tomatoes is a disease which has become more serious in the main tomato growing areas in the South Island in recent years. The incidence of the disease in the outdoor areas near Christchurch increased quite rapidly between 1955 and 1958, and *Didymella* has become the principal disease of tomato crops in the Banks Peninsula area.

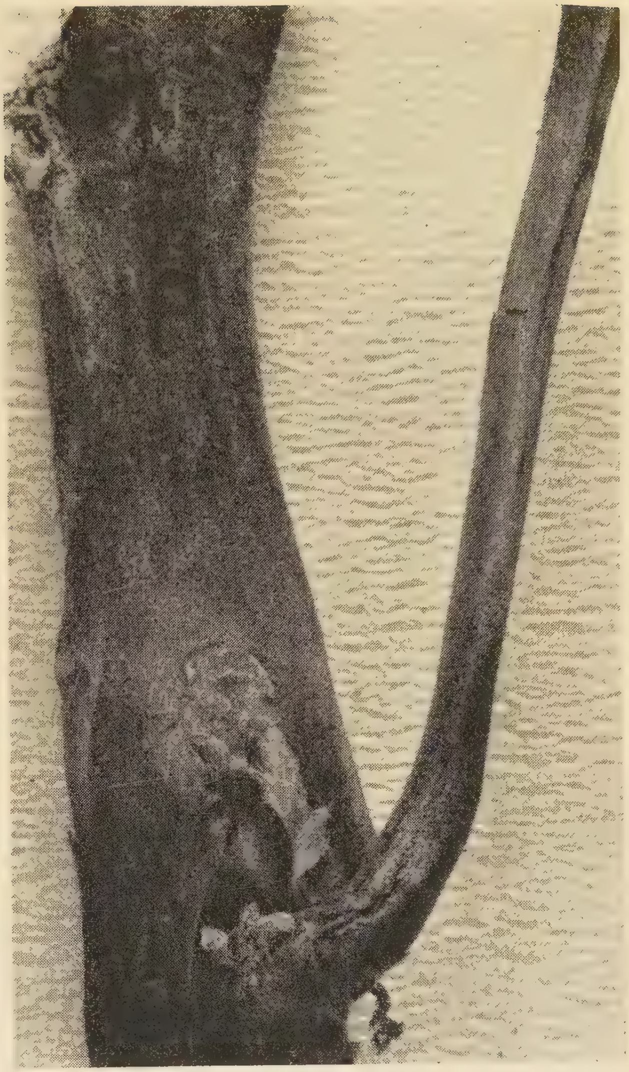
THIS fungous disease was first recorded in 1922 by Dr G. H. Cunningham ("The New Zealand Journal of Agriculture", Vol. 24, p. 39), who stated that the disease* was confined to one locality (near Timaru). Its subsequent progress has been very slow indeed, because it was next recorded (by J. Coombe, Horticultural Instructor, Department of Agriculture, Christchurch) in 1950 and in Nelson about 1955.

In the United Kingdom, particularly in the Channel Islands, *Didymella* has become so serious that many growers have given up tomatoes. This state of affairs could develop in New Zealand if suitable precautionary measures and better crop hygiene are not practised. Though *Didymella* can spread with amazing thoroughness, it has been proved on many occasions that the disease can easily be eliminated by good crop rotation and attention to the destruction of residues and other sources of infection.

Christchurch Outbreak

In March 1957 tomato growers in the Christchurch area were warned that *Didymella* could become a serious disease. They were advised to take out and destroy all infected plants during the growing season and to destroy **all** plants (including leaves and fruit residues) after the crop had been harvested.

However, several growers the following season again had a severe outbreak of *Didymella*, so it was decided to see if there was any effective spray and find out if air-borne spores could cause serious infection. The results of this trial fully confirmed the importance of hygiene, proved that spraying could also give control, and showed that very little infection originated from air-borne spores that season.



Didymella lesions on stem covered with pycnidia.

Life History of *Didymella*

The fungus is typical of many with the full life cycle containing two distinct types of spore, one water borne and the other air borne (see illustration on page 579).

Water-borne Spores

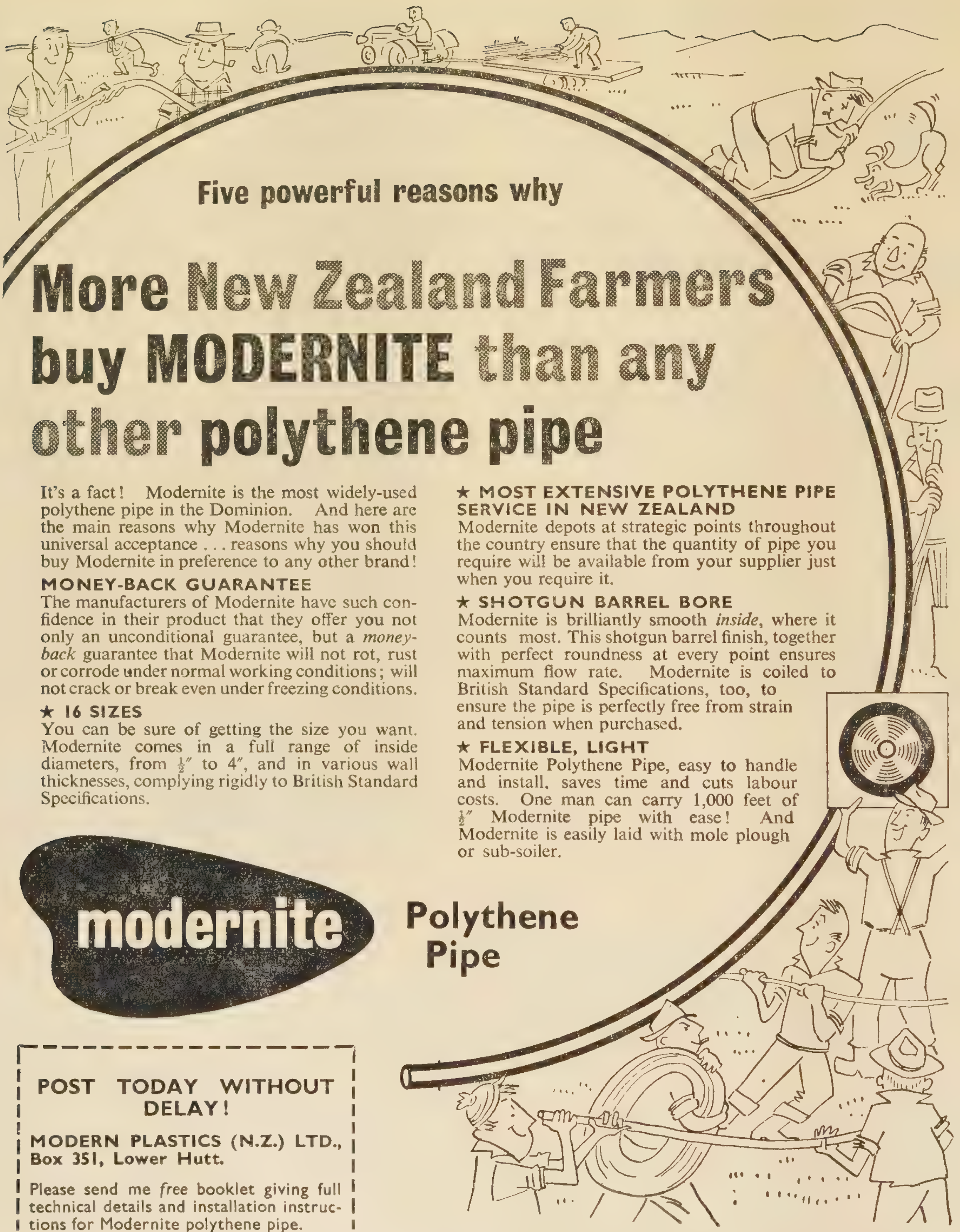
Water-borne spores (pycnospores) are produced in profusion during the growing season on stem and fruit lesions. The sunken olive-brown lesions, which are up to 6 in. long, occur near soil level, often completely circle the stem, and quickly cause total collapse of the plants.

Lesions become covered with hundreds of small black dots called pycnidia. These pycnidia, which are very resistant to drying and decay and will survive at least 18 months on old stem residues, produce millions of tiny spores which ooze out whenever the stems become wet. Each spore is capable of germinating and causing a stem or fruit infection, and quite obviously this is by far the most important stage of the fungus to eliminate.

As soon as *Didymella* infection occurs in a tomato crop the infected plants should be pulled out and burnt.

---

* Named at that time *Mycosphaerella citrullina*.



Five powerful reasons why

More New Zealand Farmers buy MODERNITE than any other polythene pipe

It's a fact! Modernite is the most widely-used polythene pipe in the Dominion. And here are the main reasons why Modernite has won this universal acceptance . . . reasons why you should buy Modernite in preference to any other brand!

MONEY-BACK GUARANTEE

The manufacturers of Modernite have such confidence in their product that they offer you not only an unconditional guarantee, but a *money-back* guarantee that Modernite will not rot, rust or corrode under normal working conditions; will not crack or break even under freezing conditions.

★ 16 SIZES

You can be sure of getting the size you want. Modernite comes in a full range of inside diameters, from ½″ to 4″, and in various wall thicknesses, complying rigidly to British Standard Specifications.

★ MOST EXTENSIVE POLYTHENE PIPE SERVICE IN NEW ZEALAND

Modernite depots at strategic points throughout the country ensure that the quantity of pipe you require will be available from your supplier just when you require it.

★ SHOTGUN BARREL BORE

Modernite is brilliantly smooth *inside*, where it counts most. This shotgun barrel finish, together with perfect roundness at every point ensures maximum flow rate. Modernite is coiled to British Standard Specifications, too, to ensure the pipe is perfectly free from strain and tension when purchased.

★ FLEXIBLE, LIGHT

Modernite Polythene Pipe, easy to handle and install, saves time and cuts labour costs. One man can carry 1,000 feet of ½″ Modernite pipe with ease! And Modernite is easily laid with mole plough or sub-soiler.

modernite **Polythene Pipe**

POST TODAY WITHOUT DELAY!

MODERN PLASTICS (N.Z.) LTD.,
Box 351, Lower Hutt.

Please send me *free* booklet giving full technical details and installation instructions for Modernite polythene pipe.

NAME ....

ADDRESS ....

....

4.9

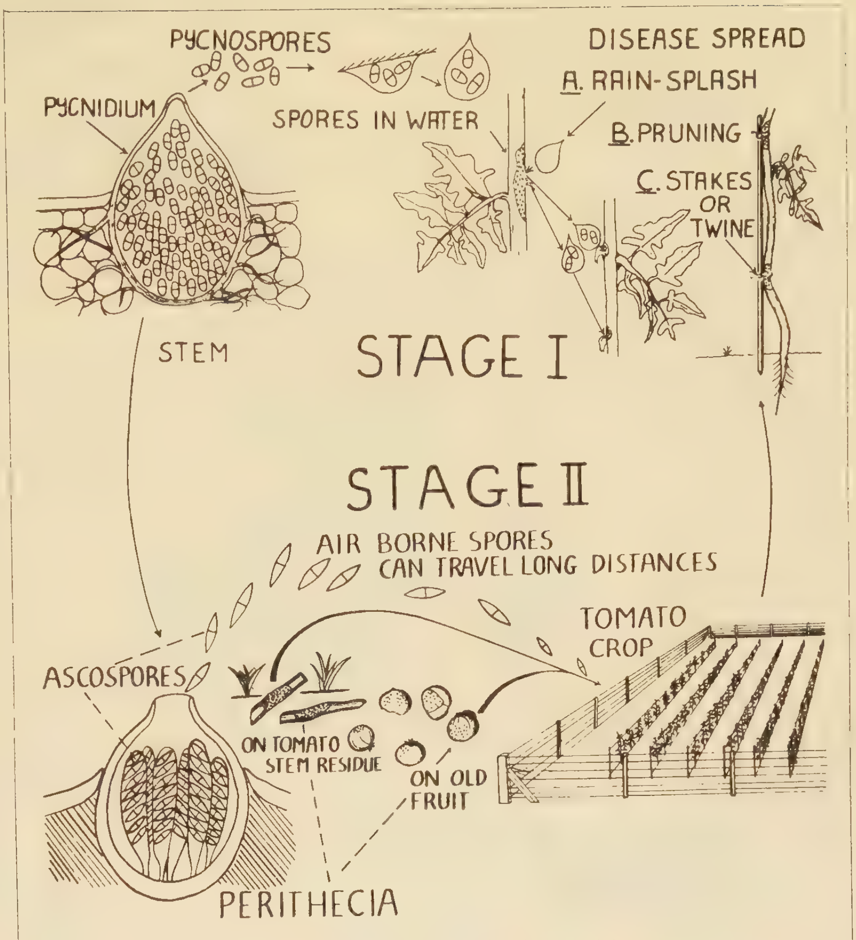
Available from Stock and Station Agents, Dairy Factories, Pipe Specialists, Farm Machinery and Equipment Suppliers, Hardware and Plumbing Merchants.

Master Distributors:

A. S. PATERSON & CO., LTD.,
Auckland, Wellington, Christchurch, Dunedin, Blenheim, Nelson, Timaru, Amberley and Invercargill.

Manufactured and unconditionally guaranteed by Modern Plastics (N.Z.) Ltd., Lower Hutt.

CONTROL OF *DIDYMELLA* STEM ROT



Life history of *Didymella lycopersici*.

Unfortunately there is a fairly long incubation period from the time of the first spore germination until the first large *Didymella* lesions are recognised. This period may be between three and six weeks, depending on temperature and rainfall or irrigation, so that by the time the first infections are recognised the disease may be widely spread. The very resistant nature of the pycnidia and their long life when dry emphasise the utmost necessity for destroying all tomato plant residues and sterilising (with 5 per cent formalin solution) all stakes, twine, implements, and glasshouses after infected plants have been removed.

Air-borne Spores

The air-borne spores (ascospores) are carried quite a long way by wind, and this is the main method for long distance spread of the disease. Air-borne spores have not yet been recognised in New Zealand, but most likely have occurred on numerous occasions and may have been responsible for the gradual spread of *Didymella* from Timaru to Christchurch and Nelson.

Though it is important to realise the existence of this type of spore and to prevent its occurrence by destroying the stem residues of plants infected with *Didymella*, it seems quite apparent from the Lincoln trial (see below) that wind-borne spores are relatively unimportant sources of infection and that it is far more important for a grower to carry out control measures on his own property than to worry about infection spreading from neighbouring tomato areas.

Seed-borne Infection

The latest research in New Zealand and overseas has shown that seed-borne infection, even from severely infected fruit, is relatively unimportant. The most recent tests in New Zealand showed that seeds extracted by acid, or fermentation, or direct drying from severely infected fruit developed into completely healthy plants when raised under glass. This does not prove that seed infection does not occur, but it does show that other sources of infection are more important.

The Lincoln *Didymella* Trial 1958-59

Sources of infection, chemical control measures, and varietal resistance to infection were investigated in a trial conducted jointly by the Plant Diseases and Crop Research Divisions of the Department of Scientific and Industrial Research and the Horticulture Division, Department of Agriculture.

Layout of Trial

The layout (see diagram on page 581) consisted of two major blocks, I and II, each with 40 plots consisting of 10 treatments replicated on each of the four varieties. The treatments were randomised within each variety. Each plot contained five plants (200 plants for each block). The trial plants were surrounded by a barrier row of the variety Best of All and the two blocks were divided by two rows of barley, which rapidly grew to about 3 ft high. Buffer rows or clumps of barley were also grown at both ends of each sub-plot to maintain plant competition and humidity and to prevent spore splashing between plots.

Cultural practices were as near to those of commercial growers as possible. Plants were supported by the post and double wire method with S hooks as clips to hold the wires together. Plants were trained on the double lateral system, which is popular in commercial practice. Three double wires were used with the bottom one about 10 to 12 in. above ground.

Methods

Tomato stems severely affected with *Didymella* were collected in the autumn of 1958 and divided into two samples. Sample 1 was kept dry in the glasshouse to keep the pycnidia with the rain splash spores alive. Sample 2 was kept outside on the soil surface to allow the development of the perithecia containing the air-borne spores.

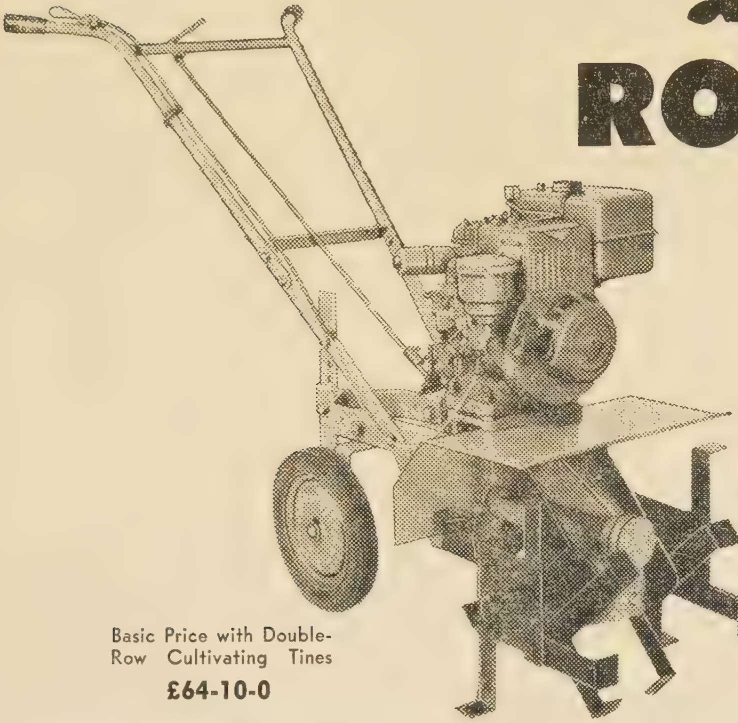
Sample 1 stems were later broken up into pieces 2 to 4 in. long and used to inoculate the soil surface round the centre plant in each plot in Block 1 of the trial. Sample 2 material was placed about 2 ft out from the boundary of Block II in four positions to allow air-borne spores to infect this block.

Varieties

To detect any large differences in susceptibility to *Didymella* stem-rot disease four commercial tomato varieties were used in the trial in four sub-blocks planted straight through both major blocks. The varieties were Harbinger, Kondine, Carters Sunrise, and Stoners Early Market.

Masport

ROTA-HOE



Basic Price with Double-Row Cultivating Tines
£64-10-0

Now available with a range of attachments for digging, cultivating, weeding and ridging.

- ★ SUPERBLY DESIGNED.
- ★ SOUNDLY ENGINEERED.
- ★ POWERED WITH BRIGGS & STRATTON 4-STROKE ENGINE.

MAIL COUPON TODAY!

F. W. CAVE LIMITED,
P.O. Box 1685, Auckland.
Please send me full details of the Masport ROTA-HOE and the name of the nearest stockist.

NAME ....

ADDRESS ....

....
JA

T1.9A

TENAC makes sprays work better because they stick longer

Now you can get more efficiency from Gorse sprays, fungicides and insecticides. Tenac as a sticking and spreading agent prolongs the effects of spray materials and gives maximum results.

Materials with wetting properties also benefit by the addition of Tenac and its "stick fast" action.

Economical and easy to apply Tenac ensures that you get the best value from your sprays at little additional cost.

TENAC is an emulsifiable oil based sticking agent formulated for use with agricultural chemicals. Particularly suitable for application with Shell Weedkiller 'B'. It may be applied with other 2,4,5-T preparations also to increase efficiency.

SHELL
TENAC
STICKING AGENT

"TENAC" is a registered trade mark.

ANOTHER SHELL PRODUCT FOR UP-TO-DATE FARMING

SHELL OIL NEW ZEALAND LIMITED
Auckland Wellington Christchurch

Spray Treatments

Trials in England by Keyworth at the National Vegetable Research Station had shown that "Dithane M22" (maneb), captan, and EMP (ethyl mercury phosphate) were the best materials to use in controlling this disease, so the trial was designed to find the effect of two concentrations of maneb and captan, both alone and combined with EMP. The treatments were as follows:

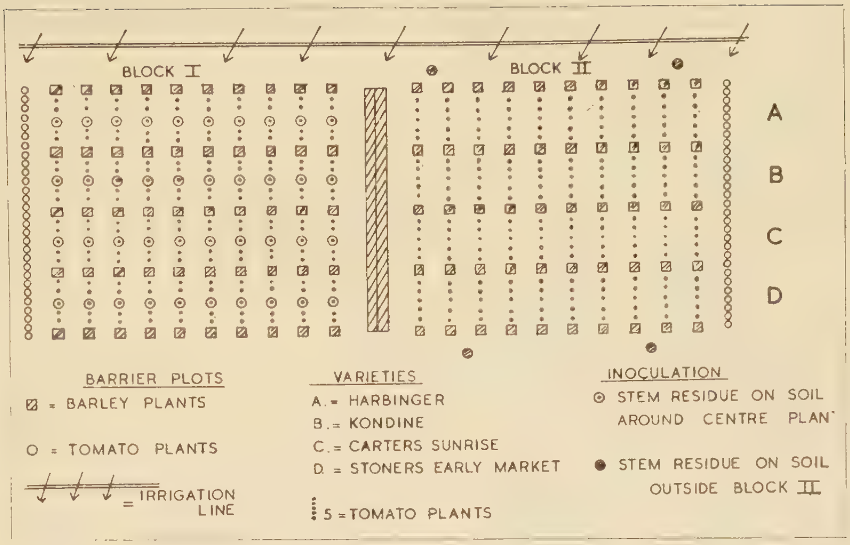
1. Maneb 1 per cent ("Dithane M22", 4½ oz to 2 gallons).
2. Maneb 0.5 per cent ("Dithane M22", 2¼ oz to 2 gallons).
3. Captan 0.5 per cent ("Orthocide 50", 3 oz to 2 gallons).
4. Captan 0.25 per cent ("Orthocide 50", 1½ to 2 gallons).
5. Maneb 1 per cent plus EMP 0.006 per cent.
6. Maneb 0.5 per cent plus EMP 0.006 per cent.
7. Captan 0.5 per cent plus EMP 0.006 per cent.
8. Captan 0.25 per cent plus EMP 0.006 per cent.
9. EMP 0.006 per cent.
10. Water only.

The EMP was available only as a 5 per cent material, which was applied at the concentration of 0.006 per cent (¾ oz to 4 gallons) for the first four sprays. For the three subsequent sprays "Ascospray" (phenyl mercury chloride) at 0.012 per cent was substituted for the EMP.

The first spray applications were made on 17 and 19 November by spraying the soil below the plants and the stems as high as the first supporting wire. On 20 November all plots were inoculated. To ensure thorough stem coverage with the fungicide a special spray lance holding two opposed whirl nozzles about 2 in. apart was used. A high-pressure knapsack pump with trigger release was used and found ideal for this work. Subsequent spray applications were made on 3 December, 18 December, 31 December, 14 January, 28 January, and 11 February, a total of seven applications.

Irrigation

Previous experiments on the control of leaf and stem diseases at the Vegetable Section of the Crop Research Division at Lincoln have been very successful largely because of the availability of overhead sprinkler irrigation which, when combined with suitable artificial inoculation techniques, has encouraged severe epidemics of the diseases being studied. Sprinkler irrigation was again used in the *Didymella* trial with outstanding success.



Layout of the *Didymella* trial conducted at Lincoln in 1958-59.

The spread of stem rot disease in the non-sprayed plots was complete in all blocks by the end of January, only nine weeks after soil inoculation with the infected stem residues. This technique apparently has not been used in other countries. Keyworth in England found that his main difficulty in spray trials with this disease was to obtain a satisfactory level of infection to compare the effectiveness of his treatments. The lower leaves and laterals on all plants were pulled off to create wounds where *Didymella* infection could occur. The spray treatments were then applied.

Results

The first *Didymella* stem infections were found on 31 December, six weeks after soil inoculation. The counts of infected plants were made subsequently at regular intervals and only those infections occurring on the sprayed area of the stems were analysed to assess the relative efficiency of the different spray treatments. The results are shown in Table 1.

TABLE 1—*DIDYMELLA* STEM INFECTIONS ON OUTDOOR TOMATO PLANTS SPRAYED WITH VARIOUS FUNGICIDES

Spray and concentration	Total stem infections out of 20	*Duncan's test 5 per cent
Maneb 1 per cent ..	1	ab
Maneb 0.5 per cent ..	4	bc
Captan 0.5 per cent ..	3	ab
Captan 0.25 per cent ..	2	ab
EMP 0.006 per cent + maneb 1 per cent ..	1	ab
EMP 0.006 per cent + maneb 0.5 per cent ..	7	c
EMP 0.006 per cent + captan 0.5 per cent ..	0	a
EMP 0.006 per cent + captan 0.25 per cent ..	1	ab
EMP 0.006 per cent ..	3	ab
Control (water)	20	d

* Any two treatments are similar if they have any letter in common; if not, they differ significantly.

All spray treatments gave very good control of the disease. The low strength (0.5 per cent) maneb sprays gave poorer control than any other spray treatment. The 1 per cent maneb and 0.5 per cent and also 0.25 per cent captan sprays gave excellent control, but the addition of EMP to these sprays did not result in any better control.

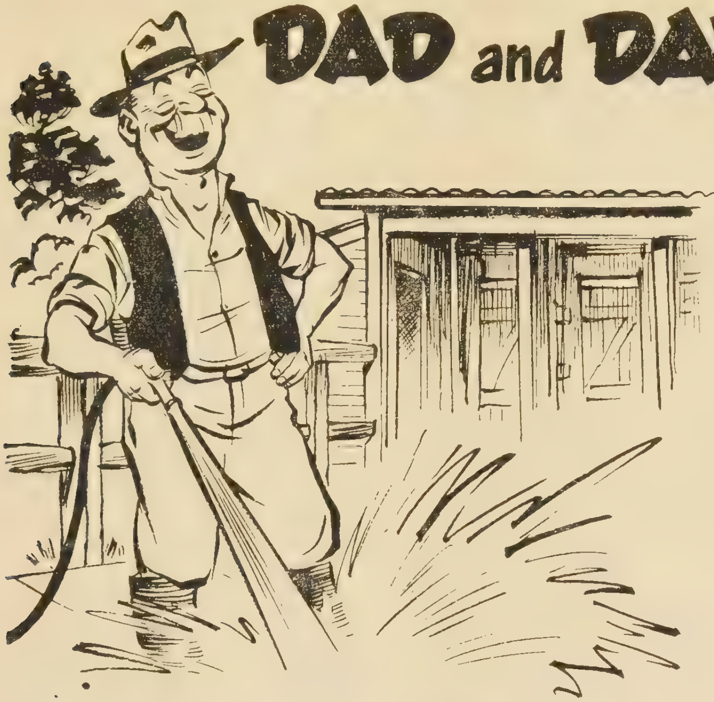
The seriousness of this disease when it affects the main stems of tomato plants is very well illustrated by the yield results, which are shown in Table 2.

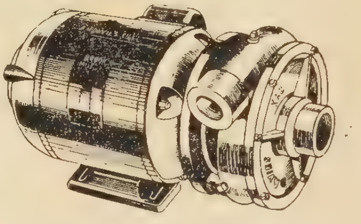
TABLE 2—YIELD OF FRUIT IN OUTDOOR TOMATO *DIDYMELLA* TRIAL

Spray treatment	Total yield	Average plot	*Duncan's test 5 per cent
Maneb 1 per cent ..	111.9	27.98	a
Maneb 0.5 per cent	108.4	27.10	ab
Captan 0.5 per cent	109.5	27.38	ab
Captan 0.25 per cent	104.4	26.10	ab
Control (water only)	52.5	13.12	c
Maneb 1 per cent + EMP 0.006 per cent	116.8	29.2	a
Maneb 5 per cent + EMP 0.006 per cent	82.2	20.55	b
Captan 0.5 per cent + EMP 0.006 per cent	112.0	28.0	a
Captan 0.25 per cent + EMP 0.006 per cent	106.6	26.65	ab
EMP 0.006 per cent	97.4	24.35	ab

* Any two treatments are similar if they have any letter in common; if not, they differ significantly.

All spray treatments gave significant increases in yield ranging from 118 per cent increase for 1 per cent maneb and 111 per cent for 0.5 per cent captan to 100 per cent for 0.25 per cent captan and only 81 per cent for 0.5 per cent maneb. EMP 0.006 per cent alone gave an increase in yield of 85 per cent, but





DAD and DAVIES ON THE FARM

Dad's been a farmer all his life, but now he has graduated from the bucket and brush stage to a snappy little Davies Shed-washing outfit. All you have got to do is to leave Dad alone and he'll play for hours washing the cowshed down . . . whereas previously it was worse than a bugbear. Why not modernise your farm and save yourself a bit of work, and install one of Davies' Shed-washing outfits, and you will be surprised how quickly you can clean down that shed, and save hours of backbreaking work. This outfit is very economical and enquiries cost nothing, so just drop us — or one of our agents — a line and we will send you full details without obligation.

Manufacturers:

D. H. DAVIES & Co. Ltd.

BOX 29, PENROSE. Phones: 594-531 & 596-337

Agents throughout New Zealand

D.D.10.B.

K2B

CAMFOSA
SUPERFINE
TEAT SALVE

milk's never tainted – higher yields too!

The contented herd pays dividends in milking let-down. Make CAMFOSA *your* safeguard against chaps, cracked teats, udder sores, that can lead to serious infection and affect your profits. CAMFOSA soothes, heals quickly, is always SOFT to apply. In 1, 2, 4 and 38 lb. tins from your local grocer or Stock and Station agent.

EFFECTIVE! DEPENDABLE! SOOTHING!

Insist on –

CAMFOSA

SUPERFINE TEAT SALVE

Made by the makers of "CAMFOSA" Germicide and Antiseptic.
N.Z. Distributors: W. & R. SMALLBONE LTD., WELLINGTON.

the addition of it to the other sprays did not result in any further significant increase in yield. Apart from the significantly low yield of the maneb 0.5 per cent plus EMP, there were no significant yield differences between the spray treatments.

Fruit Infection

Counts of the numbers of fruit infected with *Didymella* were made at each picking and the results up to 4 March are shown in Table 3.

TABLE 3—COUNTS OF *DIDYMELLA* INFECTION ON OUTDOOR TOMATOES UP TO 4 MARCH 1959

Treatment	Total number of fruit infected
Maneb 1 per cent	2
Maneb 0.5 per cent	13
Captan 0.5 per cent	8
Captan 0.25 per cent	6
Maneb 1 per cent + EMP 0.006 per cent	6
Maneb 5 per cent + EMP 0.006 per cent	3
Captan 0.5 per cent + EMP 0.006 per cent	2
Captan 0.25 per cent + EMP 0.006 per cent	2
EMP 0.006 per cent	10
Control (water only)	6

These counts and especially the subsequent counts showed quite clearly that the spray treatment applied to the stems had no controlling effect whatever on the spread of fruit infection, and the later count showed by far the highest fruit infection on the plots with the least stem infection. This of course reduced the yields of these plots. If all of each plant had been sprayed, there would have been an even greater increase in yield from the spray treatment.

Air-borne and Soil-borne Infection

Very early in the season it became apparent that soil-borne infection from old stem residues adjacent to the plant were the primary cause of *Didymella* disease. Almost without exception the centre plant next to the infected residue was the first with stem infection. The first stem infection in Block II, which was adjacent to the soil-inoculated block and where spread depended on air-borne or human agency only, occurred three weeks after the first infection was apparent in Block I. No air-borne spores could be found in the residues which were examined each month. However, pycnidia with viable spores were found on all residues right up to the end of May.

The total counts of stem infections and the fruit infections for the soil-borne and air-borne infection blocks were as follows:

Block I (soil borne): 42 stem infections and 743 fruit infections.

Block II (air borne): Three stem infections and 550 fruit infections.

The most consistent factor associated with *Didymella* infection was injury. This was found both with stem infections and with fruit infections. The former invariably occurred where a leaf or lateral had been removed to wound the stem; the latter occurred at the stalk end or in cracks on the fruit, especially toward the end of the season.

Varietal Susceptibility

Observation on the plants with *Didymella* infections on the stems above the sprayed portion (that is, high infection) were made primarily to see whether there was any difference in susceptibility between the four varieties in the trial. However, the total numbers of infections (including low and high infections) in Block I and II respectively were as follows: Harbinger 40 and 12, Kondine 40 and 5, Carters Sunrise 46 and 8, and Stoners Early Market 48 and 4 which give totals of 52, 45, 54, and 52 respectively and show remarkable uniformity in level of infection.

The totals for fruit infection were Harbinger 253, Kondine 389, Carters Sunrise 261, and Stoners Early Market 390. This suggested that Harbinger and Carters Sunrise were possibly less susceptible to fruit infection than Kondine and Stoners Early Market, but the differences are not really important.

No Resistance, but Control Attainable

This trial has shown clearly that there is no satisfactory resistance to *Didymella* in the four tomato varieties tested. However, the disease can be successfully controlled by crop hygiene or by regular application of fungicidal sprays before the disease appears.

There appears to be little danger of infection becoming epidemic in a crop when the source of infection is **outside** the crop and no good evidence of infection occurring on sound tomato stems. Therefore there is every reason why sound crop management should give satisfactory, healthy crops.

Measures Recommended

The control measures which should be adopted in areas where this disease is prevalent are as follows:

1. Remove all tomato stem residues from the tomato growing area and either burn or bury them.

2. Sterilise glasshouse soil and soil for seedling production with formalin or chloropicrin. Treat with formalin the glasshouse structure and all materials (posts, wires, twine, and stakes) used for staking or training the tomato plants during the season. Steam sterilisation is not recommended where *Didymella* has occurred.

3. Wash hands and boots after working in an infected area and before entering a clean area.

4. Avoid damage to the stems of tomato plants, especially near ground level. If leaves and laterals must be removed, use a sharp knife and cut close to the stems.

5. Apply fortnightly a spray of 0.25 per cent captan (5 lb of 50 per cent material per 100 gallons) to all parts of the plants, paying particular attention to stems and soil at the bases of plants.

6. Remove infected plants immediately and destroy them to check further spread of the disease.

7. If plants in a crop are suspected of having the disease, handle these plants separately.

8. After handling infected plants wash hands and equipment thoroughly before touching healthy plants.

Experimental Work at Nelson

By I. M. L. BROWN, Horticultural Instructor, and I. M. WATTS, Horticultural Advisory Officer, Department of Agriculture, Nelson

DIDYMELLA stem rot is a serious problem in the area of Nelson known as "The Wood". The disease was first identified there in 1955 and has since spread throughout the area. Good glasshouse hygiene as referred to above has kept the disease under control.

In 1958 officers of the Horticulture Division, Nelson, carried out a trial on the control of the disease in a tomato glasshouse. The treatments chosen were:

1. Captan 0.25 per cent (5 lb of 50 per cent material in 100 gallons of water), 4 applications.

2. Maneb 1 per cent (14 lb of 70 per cent material in 100 gallons of water), 4 applications.

3. Dichlone (¾ lb of 50 per cent material in 100 gallons of water), 4 applications.

4. Captan 0.25 per cent, 1 application.

5. Control, water only.

Plants were set out on 18 August and the treatments applied on 22 August, 16 September, 9 October, and 4 November. Delateralling was done before treatments. Five fluid ounces of spray material was applied to the base of each plant at the first application and 2 fl. oz. sprayed on the stems below the first truss at subsequent applications. No artificial inoculation with *Didymella* was possible in a commercial glasshouse.

The first *Didymella* infection was noticed on 9 November. Detailed

(Continued on page 584)

Farm Production Statistics in 1960 Will Become Part of World Census of Agriculture

THE collection of farm production statistics at the end of January each year will in 1960 take on special significance, states the Government Statistician, as New Zealand will again be participating in the World Census of Agriculture conducted by the Food and Agriculture Organization of United Nations (FAO). This is a 10-yearly census to obtain internationally comparable statistics and was originally conducted in 1930 by the International Institute of Agriculture, when some 67 countries participated. The war prevented a further census being taken in 1940, but in 1950 the collection was undertaken by FAO.

IN New Zealand the Department of Statistics is fortunate in that when it is called on by United Nations to contribute to a report of this magnitude, it is able to use existing facilities. In other words, from a collection and compilation point of view the usual routine practices are observed.

Cooperation from Farmers

In this collection, as in any other, everything depends on the primary data. Unless the information is both complete and accurate the value of all the subsequent work—checking, adding, and tabulating—is greatly reduced. Here the Government Statistician points out that, in every collection of farming statistics conducted in New Zealand, the Department has enjoyed the cooperation of farmers, and the high regard in which New Zealand statistics are held internationally stems from such assistance.

When they receive the familiar occupier's schedule at the end of January farmers will be taking part in an inquiry which, in its various forms, goes right back to the earliest colonial days. Several methods have been adopted and for a period until 1952 farming statistics—agriculture and pastoral statistics as they were then called—were collected by the police. However, in 1953 a postal system of collection was adopted. This has been the practice since, with the exception of 1956, when the agricultural census was taken with the population census.

A sampling procedure was also adopted in 1953. Statistics were based on a representative cross-section of about 14 per cent of farm holdings, which were scientifically selected in such a way as to include all types of holdings regardless of their productivity. A full collection was undertaken in 1956 and again in 1957, but the sample basis was again adopted in 1958, and was brought into conformity with the general practice of area unit sampling in use throughout the Department. As an integral part of the World Census of Agriculture a full collection will again be undertaken in 1960.

New Method of Listing

For 1960 the Department has altered its method of listing farms. Since 1956 the list of holdings has been the one compiled at the time of the census from forms filled in by the farmer himself. In 1960 the list of farmers and area of holdings is to be taken from the Valuation Department's rolls and the areas may therefore differ slightly from existing records in some cases. Use of these rolls should make this survey more comprehensive than any previously undertaken.

Radio Broadcasts

BROADCASTS for farmers will be given as follows in January from the stations listed below. Farming sessions have been suspended during January from Auckland, Dunedin, and Invercargill and at Rotorua from mid December to mid January.

1XH Hamilton, Mondays at 12.36 p.m. ("For the Farmer", excluding first Monday in month and public holidays), Wednesdays at 12.33 p.m. ("Report from Ruakura").

2YZ Napier, Tuesdays at 7.10 p.m. ("The Hawke's Bay Farmer"), and Thursdays at 12.33 p.m. ("News for the Farmer").

2XG Gisborne, Tuesdays at 8 p.m. ("Farm Session").

2XP New Plymouth, Thursdays at 8 p.m. ("Farm Session").

2XA Wanganui, Mondays at 8 p.m. ("For the Man on the Land"), Tuesdays at 8 p.m. ("Farm Supplement"), and Thursdays at 8 p.m. ("Farm Topics").

2XN Nelson, Thursdays at 8 p.m. ("Nelson Farm Topics").

2ZA Palmerston North, Mondays at 12.36 p.m. ("Country Digest") and Fridays at 8.30 p.m. ("Country Digest", including Feilding stock market report).

2YA Wellington, Mondays, Tuesdays, and Fridays at 7.10 p.m. ("Farm Session"), Thursdays at 12.33 p.m. ("News for the Farmer").

3YA Christchurch, Mondays at 12.20 p.m. ("Country Session"), Thursdays at 12.33 p.m. ("News for the Farmer") and 7.10 p.m. ("Home Paddock").

3XC Timaru, Wednesdays at 8 p.m. ("Farmers' Weekly News Service") and Saturdays at 10.30 a.m. ("Country Mailbag").

3YZ Greymouth, Mondays at 12.36 p.m. ("Farm Session") and Thursdays at 12.33 p.m. ("News for the Farmer").

Didymella *Disease of Tomatoes*
(Continued from page 583)

examinations were made every 14 days from then and by 23 December the number of infected plants in each treatment was: captan (4 applications), 2; maneb (4 applications), 5; dichlone (4 applications), 15; captan (1 application), 33; and control (water only) 35.

Statistical analysis of the results showed clearly that four applications of captan and maneb effectively reduced infection. Similar trials were carried out in other glasshouses, but the levels of infection were very low.

In these trials the interval between spray applications (3½ weeks) was longer than in the Lincoln trials. Growers are naturally anxious to keep the number of sprays to a minimum consistent with good control; further trial work on this point seems necessary.

Recommended Precautions

From this trial the following tentative precautions appear warranted for Nelson glasshouses:

1. A programme of strict glasshouse hygiene according to the recommendations made on page 583.

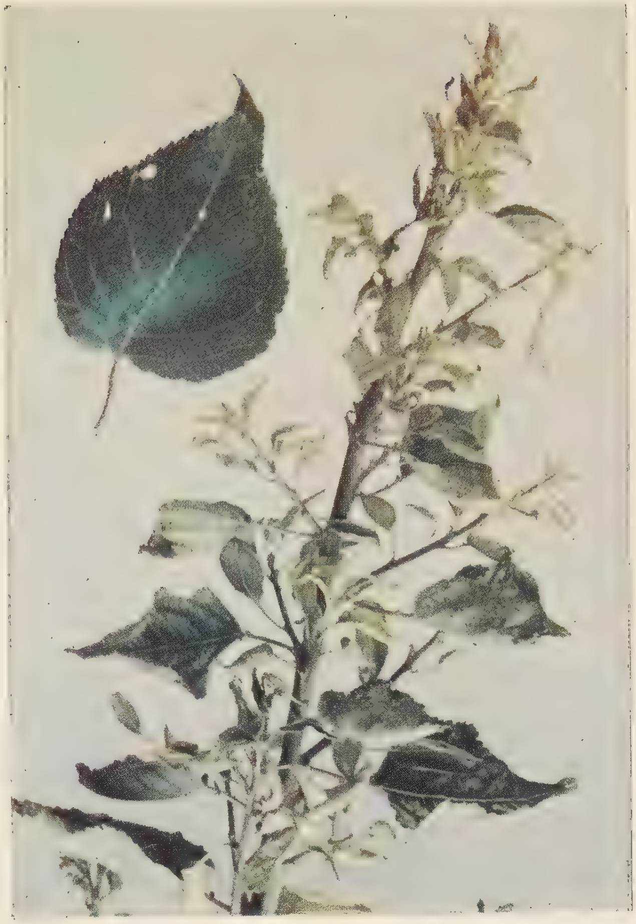
2. Apply at least three sprays of captan 0.25 per cent or maneb 1 per cent.

The first application should follow delateralling of the lower nodes at the time plants are tied up; the second should be made before the first main watering (about the end of October in Nelson) and the third when the lower leaves are removed. The spray should be applied to the lower part of the main stems and to any wounds. About 17 gallons of spray will be required per 1,000 plants for each application.

Horticultural Research

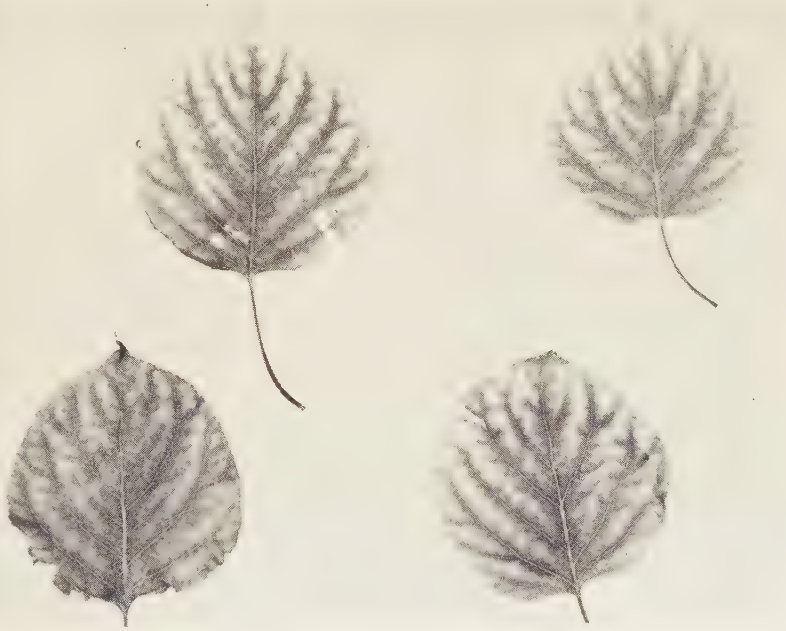
Zinc Deficiency of Newcastle Apricots

PIP and stone fruits are both affected by zinc deficiency in certain parts of the Alexandra district. The most susceptible apricot variety appears to be Newcastle, but all the varieties commonly grown can be affected. In this article W. S. Kemp, Horticultural Instructor, Department of Agriculture, Alexandra, reports on a zinc deficiency trial carried out on a block of young Newcastle apricots growing in the Clyde-Cromwell Gorge.



▲ Terminal shoot showing zinc deficiency. Healthy leaf at top left.

▼ Fig. 1—Interveinal leaf chlorosis in Newcastle apricot due to zinc deficiency.



IN 1953 after a lead given through a series of tree injections carried out in the Alexandra district by W. B. Healy, Soil Bureau, trials in collaboration with E. G. Bollard, Fruit Research Station, were laid down in various orchards. These have since demonstrated the importance of zinc deficiency in pip and stone fruits in certain parts of the Alexandra district. An account by E. G. Bollard of some of this work has been published in the "Orchardist".

In the trial on the block of young Newcastle apricots growing in the Clyde-Cromwell Gorge, symptoms were first noticed during the 1952 season, when the trees were three years old. The trouble was confined to a portion of the block sited on a small fan laid down within fairly recent years from a wash on the side of the gorge. The soil was light, containing a large percentage of broken schist, and was subsequently found to have a pH of 8.2.

the jungle has grown smaller

T.V.L. produces vaccines against:
Blackleg, Pulpy Kidney,
Contagious Abortion, Leptospirosis,
Ram Epididymitis, Scabby Mouth,
Canine Distemper, Feline Enteritis,
and other bacterial and viral infections.

TVL
and animal health

From earliest times "guardianship of the flocks" has been the great responsibility of those whose livelihood came from the husbandry of domestic animals. For hundreds of years, dangers lurked on every side; fanged, toothed and clawed. Shepherd and herdsman were forever on their guard:
the jungle was always very close.
In our world the jungles and the predators have been pushed far back. But dangers still threaten the domestic beasts. They are microscopic, insidious, silent . . . all are harmful, some can kill! That is why even in this serene and fertile land, where bountiful sunshine and the soft, swift-passing rain provide a heritage of miraculous productivity, the vigilant farmer asks science for the means of safeguarding his animals against disease.
In this work, T.V.L. is vitally conscious of its responsibility to contribute to the promotion of "Animal Health" Much has been accomplished: what remains to be done has our dedicated attention.

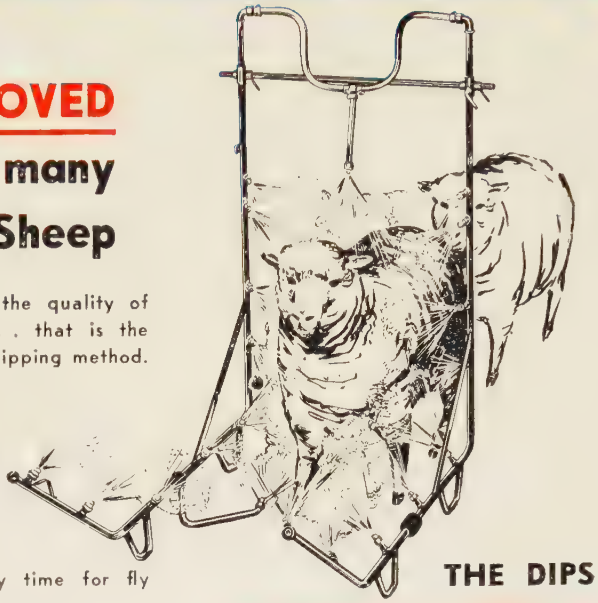
TASMAN VACCINE LABORATORY LIMITED
P.O. Box 29, Upper Hutt.

SAVE POUNDS ON DIPPING

Elliotts

Spray dipping PROVED last season on many millions of N.Z. Sheep

Elliotts All-Spray 40 and Diel-Spray 25 have the quality of working down the wool fibres to the skin . . . that is the reason for the outstanding success of this new dipping method.



POISON
SUFFICIENT FOR
SHEEP
Elliotts
ALL-SPRAY 40
NET CONTENTS 1 GALLON
ELLCO LIMITED, AUCKLAND, N.Z.

Sheep may be dipped straight "off-shears." No recirculation of wash . . . no risk of infection . . . no stripping . . . no clogging of jets.

Sheep can be treated in any weather except heavy rain, and are easily handled at any time for fly strike control.

And . . . the cost of dipping per sheep is substantially lower than other methods.

THE PORTABLE SPRAY RIG

Elliotts Century Holton Sheep Sprayer costs much less than plunge or large shower dip and can be quickly set up wherever there is a water supply of 260 gallons per hour. (A day's shearing of 500-600 sheep can be effectively handled in about 15 minutes.) Spray pump operated by P.T.O. or motor unit obtainable.

THE DIPS

ELLIOTTS ALL- SPRAY 40

For Lice, Ked and Blowfly control. One gallon makes dipping fluid for approximately 2,560 sheep. LESS THAN ½d. PER SHEEP; *or for*

Extended Blowfly control. One gallon sufficient for approximately 1,600 sheep. Costs just over ¾d. per sheep.

ELLIOTTS DIEL - SPRAY 25

For Lice, Ked and Blowfly control. One gallon makes dipping fluid for approximately 1,600 sheep. LESS THAN 1d. PER SHEEP; *or for*

Extended Blowfly control. One gallon sufficient for approximately 1,000 sheep and costs 1¼d. per sheep.

THESE PROVEN PRODUCTS ARE AVAILABLE FROM YOUR ELLIOTTS SUPPLIER

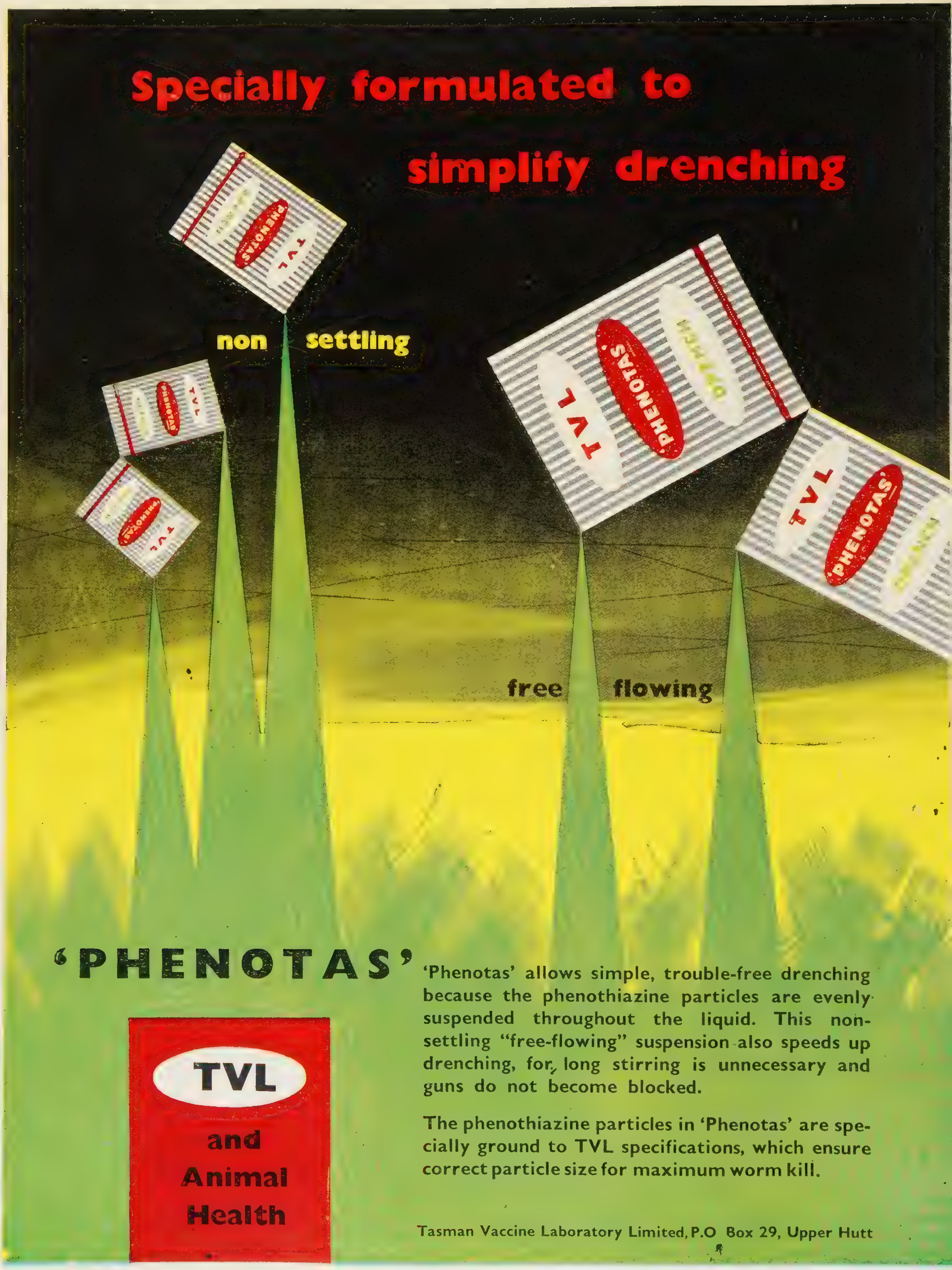
POISON
SUFFICIENT FOR
SHEEP
Elliotts
DIEL-SPRAY 25
NET CONTENTS 1 GALLON
ELLCO LIMITED, AUCKLAND, N.Z.

Elliotts
CENTURY HOLTON
SHEEP SPRAYER

Elliotts
ALL-SPRAY 40 or
DIEL SPRAY 25

CHEAPER
QUICKER
BETTER
MORE POTENT—
YET THEY COST
FAR LESS

Manufactured and Marketed by D.H.A. RURAL (N.Z.) LTD., ONEHUNGA, AUCKLAND (A Division of Drug Houses of Australia Ltd.).



Specially formulated to simplify drenching

'PHENOTAS'

'Phenotas' allows simple, trouble-free drenching because the phenothiazine particles are evenly suspended throughout the liquid. This non-settling "free-flowing" suspension also speeds up drenching, for long stirring is unnecessary and guns do not become blocked.

The phenothiazine particles in 'Phenotas' are specially ground to TVL specifications, which ensure correct particle size for maximum worm kill.

TVL
and
Animal
Health

Tasman Vaccine Laboratory Limited, P.O Box 29, Upper Hutt

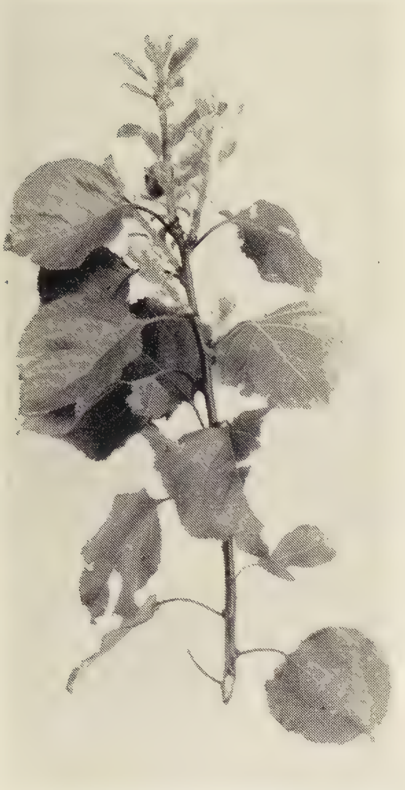


Fig. 2—Early stage of second growth cycle, showing small chlorotic leaves on new shoots developing in leaf axils

Symptoms were principally a mild leaf chlorosis, with a lighter interveinal colour very similar to that of manganese deficiency from which it was difficult to distinguish.

Others had typical rosetting and little leaf symptoms together with leaf chlorosis. There was a strong tendency for new shoots to develop laterals from the leaf axils when the second growth cycle began in summer, giving a feathery or "witch's broom" effect. Leaves were smaller and harsher looking, buds were more prominent, and in the more severely affected trees growth was considerably reduced.

In February 1953 after the grower had applied to separate parts of the block sprays of zinc sulphate plus hydrated lime and manganese sulphate plus hydrated lime there appeared to be some reduction in the chlorotic effect on the foliage where zinc sulphate had been applied. A further zinc sulphate spray was applied later in autumn over the whole block. During the following season symptoms were very mild, being confined to those trees which had shown severe symptoms the previous season.

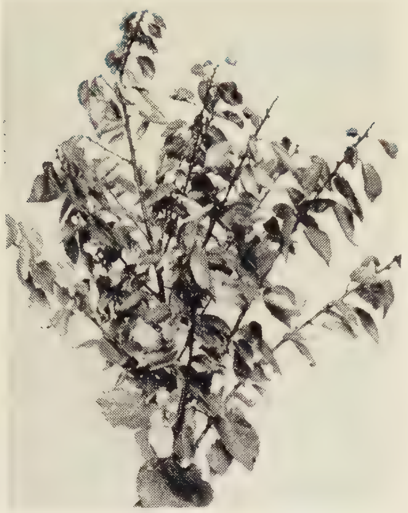


Fig. 3—A moderately affected shoot

In the spring of 1954-55 leaf symptoms began to appear quite early, and indications were that the incidence would again be fairly severe. Trials were laid down using sprays of zinc, manganese, and chelated iron, both alone and in various combinations, to test the possibility of a combination deficiency.

Two applications were made, in February 1955 and November 1955. No response was obtained and later it was found that the material used as zinc sulphate was not true to label; consequently in February 1956 a further series of treatments was applied. At that stage the foliage on all trees showed a marked reduction in chlorotic effect as compared with the spring, probably due to seasonal fluctuation and varying weather.

In the spring of 1956, while chlorosis was evident on some trees, there was no sign of it on any of the trees receiving zinc either alone or in combination with manganese or iron. By February 1957, though slight leaf symptoms had begun to show in odd leaves of the zinc-treated trees, the incidence was much reduced in comparison with that on other treatments, and growth in previously severely affected trees which had received zinc was considerably improved.

This was considered sufficient evidence to assume that the chlorosis was due to a zinc deficiency and this diagnosis has been borne out by the fact that foliage chlorosis has been almost entirely eliminated by the grower applying annual sprays of zinc sulphate since, and growth on previously severely affected trees has become normal.

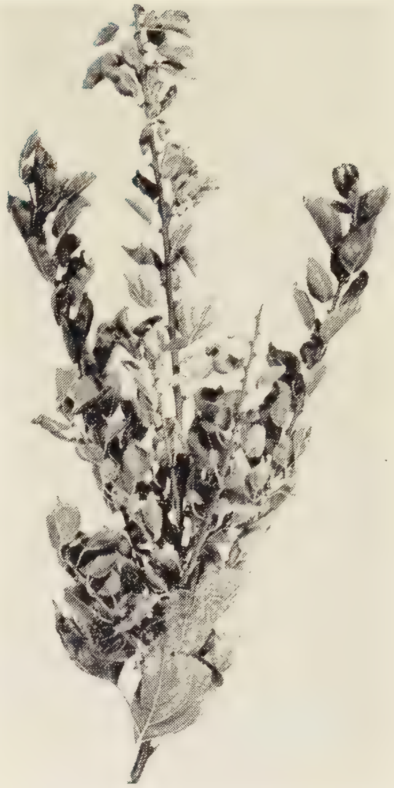


Fig. 4—Severe witch's broom effect, showing small, harsh, cupped and chlorotic leaves, and on a partially defoliated shoot, the prominent buds.

Toward the close of this trial the trees had begun to crop and it was apparent that zinc deficiency also affected cropping ability. Severely affected trees carried very few fruits, and what fruit was produced was much smaller than normal. This tendency has also been observed on apricots which have shown zinc deficiency symptoms on other properties in the district.

From this and other trials, as well as results obtained since by various growers, it is apparent that, particularly on light sandy soils or where the soil tends to be fairly alkaline in reaction, zinc deficiency can affect both tree growth and cropping.

On these soils zinc sulphate plus hydrated lime (bordeaux formula, 6-8-100) applied annually as a foliage spray either in late spring or early autumn will assist in correcting any deficiency and promote better growth and cropping. Application of zinc sulphate alone at 25 to 50 lb per 100 gallons during the dormant season is also effective.

◆

KITCHEN

WHEN the kitchen is due to be redecorated the do-it-yourself painter may be in doubt as to which colours to choose, how many to use, and in what proportions. Valuable advice can be obtained from colour consultants and reliable paint firms, but those with enterprise may want to feel that the choice and final result are essentially their own. A complete knowledge of the complicated subject of colour would involve extensive study, so this article aims at giving briefly sufficient background knowledge to enable the amateur to plan a successful scheme for herself.

IN contrast to rooms such as bedrooms and living rooms, which are intended primarily for rest and relaxation, the kitchen is planned for activity. However, excessive use of gay colours may be stimulating to a degree which becomes distracting or even exhausting, so the objective is to produce an effect which will encourage activity but still retain an atmosphere of calm efficiency.

How Many Colours?

Some people feel that the more colours that are used the more effective the scheme will be, but authorities on interior decoration hold that three colours are the maximum for good results. If, despite this, a kaleidoscopic effect is desired, probably the kitchen is the place where some liberties can be taken.

It would be advisable, though, to restrict the use of additional colours to places such as cupboard interiors which would be seen only when the doors were opened and so would not affect the general colour plan. At all costs a patchy effect should be avoided and the more conservative will adhere to the safer choice of a one-, two-, or three-colour harmony.

Combining Colours

The simplest guide for selecting colours which will blend harmoniously is the colour wheel (see page 592). This consists of an arrangement in a circle of the colours of the spectrum, that is, the colours which are seen when the light is reflected through a prism. These colours in their pure state are called "hues" and are identical with the colours in a rainbow.

The three primary colours are blue, yellow, and red. A combination of two primaries produces the secondary colours, which are orange, violet, and green; the tertiary colours, yellow-orange, red-orange, red-violet, blue-violet, and blue-green, are formed by combining a primary and a secondary.

Though many colour names are used on paint charts and for fabrics, the basis for all of these is the spectrum colours. Paint charts are an invaluable aid in selecting colours, but it is useful to be able to translate the names used into their counterparts on the colour wheel. Thus, for example, turquoise becomes blue-green; shrimp becomes red-orange; and lime becomes yellow-green.

Tints, Shades, Greyed Colours

For decorating, colours are seldom used in their full intensity, being modified either by addition of white to produce a "tint" or of black to produce a "shade". Frequently both black and white are added to produce a "greyed" colour.

All good colour schemes are made up of tints, shades, and/or greyed colours with small amounts of a pure hue used for accent. Because colour is intensified when it covers a large area, lavish use of vivid tones may become overpowering. On the other hand colours when greyed become much softer and will harmonise more readily with other colours. When the larger areas are in subdued colours small amounts of a bright accent colour will effectively add interest.

Black and white are "neutrals" and can be used with any colour scheme. White particularly is the decorator's ally, and frequently provides the solution when a contrast is required but when a colour is not suitable.

The use of colours of different intensities is known as tonal variation and produces much more interesting effects than if the colours are all the same strength. "Something dark, something light, something dull, and something bright" is a maxim which is easy to remember and worth applying.

Using the Colour Wheel

To avoid expensive mistakes and to achieve a good colour arrangement, one of the following types of schemes which are acknowledged as being satisfactory can be worked out from the colour wheel.

The first is called a **monochromatic** or one-colour scheme. This consists of one colour used in different tones. For instance, if yellow is chosen for the basic colour, the scheme will include yellow from its lightest tint through the different tonal values to brown, which is a "shade" of yellow. As no contrasting colour is used, materials of interesting texture should be chosen for background, floors, benches, and curtains. Use may be made of black, white, or grey, which are neutral.

By ELEANOR COUSTON,
Home Science Instructor,
Department of Agriculture,
Christchurch

COLOUR SCHEMES

The second is the **analogous** or **related** scheme. In this is used a series of colours adjacent to each other on the colour wheel and containing one colour in common; for example, yellow-orange, orange, and red-orange.

The third scheme is the **complementary**, where two colours directly opposite each other on the colour wheel are used; for example, blue-green and red-orange. It is also known as a contrasting colour scheme and produces a more definite effect than the more subdued monochromatic or related schemes.

A variation of this is the **split-complementary**, which uses one colour on the wheel combined with the two colours on either side of its complementary; for example, red, blue-green, and yellow-green.

The fourth scheme is the **triad.** This consists of three colours equidistant from each other on the colour wheel; for example, blue, yellow, and red.

How Much of Each Colour?

The rules for the amounts of each colour to use are flexible, but unequal areas of different colours are more pleasing than equal areas and **one colour should always predominate.** The dominant colour, that is the one to be used in the greatest amount, is chosen first, and the other colours are selected according to whether a one-, two-, or three-colour scheme is preferred.

A fair standard to follow when using three colours is to estimate that about two-thirds of the total surface area will be in the dominant colour and the remainder in varying proportions of the other two colours. The dominant colour is usually a shade, tint, or a greyed colour, the second colour in medium tones, and the third or accent colour in bright, bold tones.

Limiting Factors

In the application of knowledge of these basic principles there are still certain limiting factors.

Aspect

If the kitchen is on the cool side of the house, one of the warm colours from the right side of the colour wheel (from yellow to red-violet) may be chosen as the dominant colour, but if it has a bright, sunny aspect, a cool colour from the left side (yellow-green to violet) will be more appropriate. If a contrasting colour is used, it will come from the opposite side of the colour wheel.

If the kitchen interior can be seen from the hall, dining room, or entrance porch, the colours chosen should blend with the colours used in these related areas.

Floor Covering

As the floor covering, which in the kitchen is generally linoleum, will almost certainly outlast the paint work, it should be selected carefully so that both its colour and pattern will not restrict too greatly changes which may be made in the future. It occupies one of the major areas and should be chosen first, because paints can be matched to it more readily than vice versa. Though from the decorator's viewpoint linoleums in the deeper tones of red, blue, green, or charcoal are very effective, when one is wanted which will not show footmarks the marbled greys or fawns are more practical.

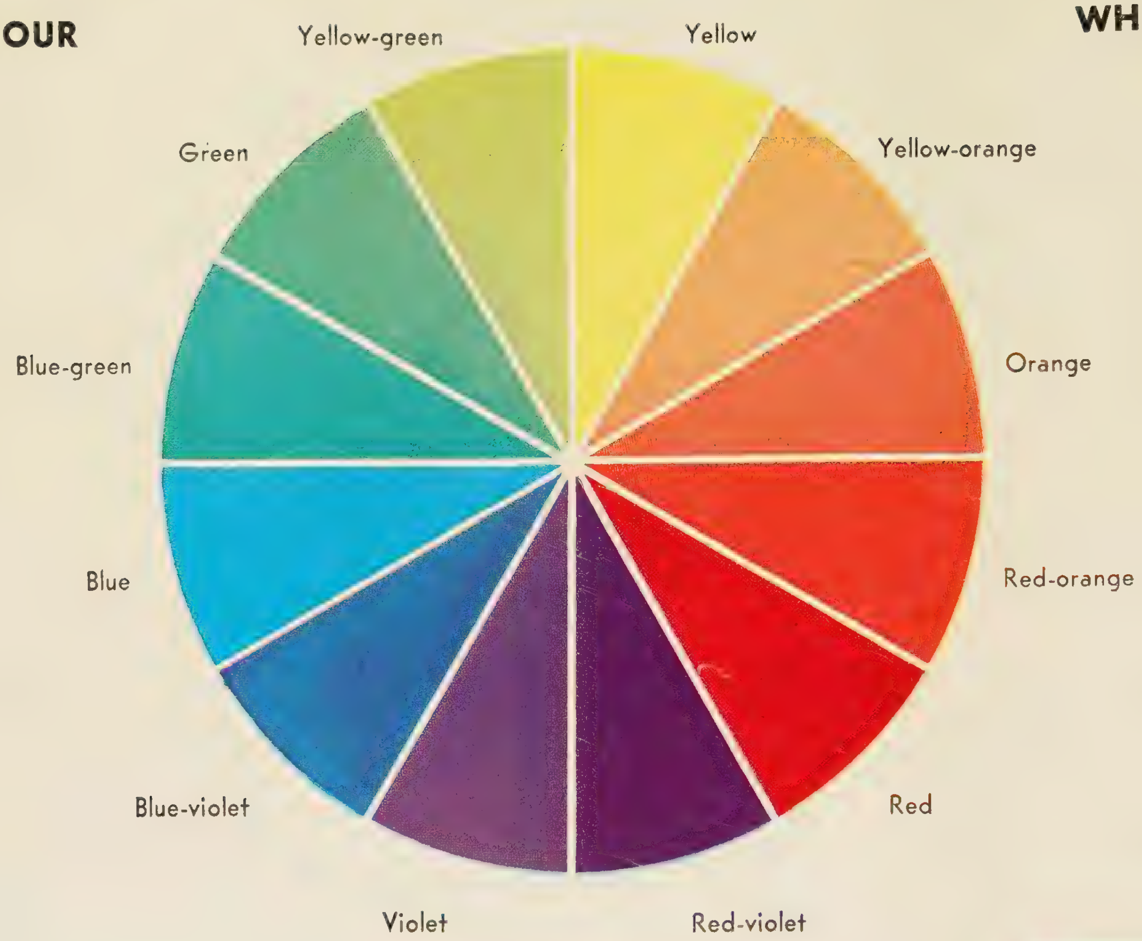
Bench Surfaces

Bench surfaces are also comparatively permanent and should be chosen next. They may either match or contrast with the floor covering, but as glare from a harsh colour can be trying on the eyes, a soft, favourite colour is advisable.

Permanent Appliances

The colour of permanent appliances such as the stove and refrigerator will also affect the scheme. There has been an increasing demand for coloured appliances, but it should be borne in mind that these will place more limitations on the choice of other colours than would white.

COLOUR WHEEL



Examples of Colour Schemes

1. MONOCHROMATIC OR ONE-COLOUR
(Yellow)

Floor	Dark grey (charcoal)
Bench tops	Yellow
Walls	Light grey
Ceiling	Pale yellow
Cupboards	Yellow
Curtains	Deep yellow
Accessories	White and black

2. ANALOGOUS OR RELATED
(Yellow-orange, orange, red-orange)

Floor	Brown
Bench tops	Red-orange (rust)
Walls	Pale yellow-orange (peach)
Ceiling	Very pale yellow-orange
Cupboards	Blond wood and white trim
Curtains	Red-orange
Accessories	White and brown

3a. COMPLEMENTARY
(Blue-green, red-orange)

Floor	Deep blue-green (jade)
Bench tops	Light blue-green
Walls	Pale red-orange (pale apricot)
Ceiling	Very pale red-orange
Cupboards	Blue-green
Curtains	Red-orange
Accessories	White

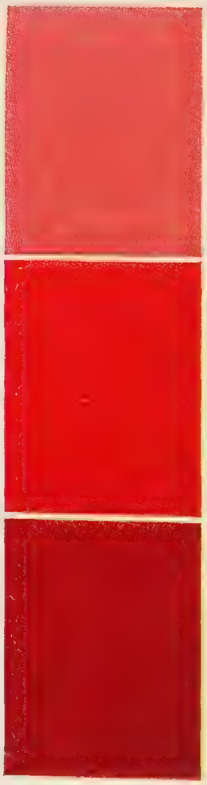
3b. SPLIT COMPLEMENTARY
(Yellow, green, red-violet)

Floor	Deep yellow (marled)
Bench tops	Deep yellow (marled)
Walls	Deep green
Ceiling	Very pale yellow
Cupboards	Pale yellow
Curtains	Red-violet (rose) and white
Accessories and between cupboards and bench tops	Red-violet (rose)

4. TRIAD
(Blue, yellow, red)

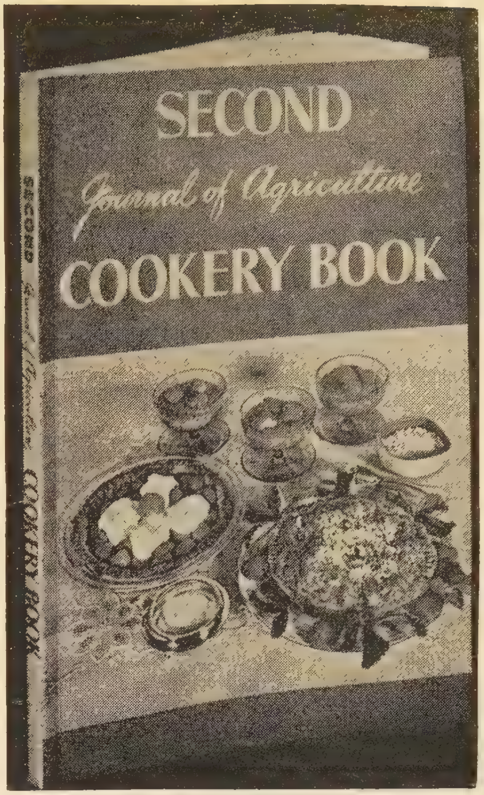
Floor	Grey-blue with red and yellow spatter
Bench tops	Deep red
Walls	1 papered (white background and pattern) 3 light grey-blue
Ceiling	White
Cupboards	Yellow
Curtains	Yellow
Accessories	Red

For decorating, colours are seldom used in their full intensity, being modified either by addition of white to produce a "tint" or of black to produce a "shade". Frequently both black and white are added to produce a "greyed" colour.



Second "'Journal of Agriculture' Cookery Book"

WOULD it pay me to install a home freezer to deep freeze garden produce? How can I make chilli sauce? Waffles? Flaky pastry? These are just a few of the topics, chosen at random, that are discussed in the second "'Journal of Agriculture' Cookery Book", published recently by A. H. and A. W. Reed, Wellington.



THE first "'Journal of Agriculture' Cookery Book", published in 1955, comprised recipes from the "Journal" that dealt with the preparation of dishes for substantial meals. Its successor contains 208 pages and nearly 650 recipes for the lighter side of cookery—quickbreads, muffins, gems, scones, pastries and pies, biscuits and cookies, jams and jellies, pickles and sauces, sweets, cooking for the sick, beverages, snacks and savouries, packed lunches, and sandwiches.

The recipes are conveniently indexed and offer new methods of preparing favourite dishes. For instance, preparation of sweet corn dishes is described.

For those who have to prepare packed lunches and sandwiches for their families there are sections to cater for the wants of indoor workers, outdoor workers, and school children. Each section contains suggestions for five days of the week and for fillings suitable for summer and winter to make the packed lunch as nutritious as main meals at home. For instance, on Monday the indoor worker gets stuffed egg in lettuce leaf, cheese and bacon savouries, buttered nutbread and date sandwiches, orange sections in a small screw-top jar, and coffee. For the outdoor worker there is Aberdeen sausage sandwich with pickles or chutney and lettuce (from previous day's dinner), buttered cheese scones, apple and raisin turnover, apple, and a vacuum flask of soup. Suggestions for children's lunches are cheese scones, buttered, with filling of mashed egg and parsley or cooked vegetable and salad dressing, buttered home-made bread, and apple.

The book is a valuable contribution to New Zealand cookery and like its precursor is well worth a place in the kitchen.

Copies are available from main offices of the Department of Agriculture for 6s. 9d., post free, and from booksellers.

Kitchen Colour Schemes

(Continued from page 592)

Windows and Lighting

The position and size of the windows and the reflection of light must also be considered. Dark colours absorb light and tend to reduce the apparent size of a room, while light colours reflect light and create an atmosphere of spaciousness. A wall facing a window will appear lighter than the window wall, so a deeper shade may be suitable on this wall. Dark ceiling colours may be smart in a restaurant, but can be oppressive in a restricted space. White or pastel tints are usually the most attractive for a kitchen ceiling.

Good lighting is essential for an efficient kitchen and is an important factor in reducing fatigue, so the objective is to produce good seeing conditions without glare. Artificial light may create very different effects from daylight, so before colours are finalised they should be tested in both.

Where to Start

Every kitchen has a certain character, and preliminary planning should include a critical study of how best to develop its potentialities. Which features can be emphasised and which perhaps would be better disguised? The decoration suited to a contemporary city apartment will be very different from that in an older type farmhouse, but each in its way can be made equally charming.

The individual touch may be introduced in various ways. For instance, a patterned washable wallpaper might be chosen for one wall, particularly if the kitchen is well ventilated and the paper will not be subjected to steam. This type of background is well suited to a dining area or might be used in the space between above-bench and below-bench cupboards. This feature paper might then serve as the basis for the remainder of the colour scheme.

A curtain fabric may hold special appeal and an effective scheme might be worked out from it. In place of curtains, some may favour glazed chintz blinds which, though rather less serviceable than holland, will serve a dual purpose and combine the functions of both curtains and blinds. Other possibilities exist; perhaps a set of unusual tiles, attractive pottery, or gleaming copper-based saucepans. A background can be chosen for these which will make them a definite and attractive feature.

The common mistake of including too many patterns is less likely to occur in a kitchen than in other rooms. However, if either a patterned floor covering or a patterned paper is used, a plain, checked, striped, or spotted fabric will be better for the curtains.

For both practical and aesthetic reasons blond-finished wood has gained in favour, and if this is preferred to paint for cupboard exteriors and doors, there is scope for the use of colours on other surfaces. The wood itself is subdued yet warm in colouring, so gay, earthy colours and white trim combine well with it.

With the character of the room in mind and with regard for the principles of colour harmony, samples of linoleum, bench surfaces, fabrics, and paint charts can be collected. From these a selection can be made which will form a unified scheme.

A check on the colour wheel to see whether the choice conforms with one of the accepted colour combinations, an allocation of the amounts of each colour according to the rules of good proportion, and a test in both daylight and artificial light will give the final assurance that work can safely proceed.

POISONOUS PLANTS in the Flower Garden

By K. H. MARCUSSEN,
Horticulturist,
Department of Agriculture,
Christchurch

MANY poisonous plants grow in the average flower garden, and though harm seldom results, it is well to know of these hidden dangers so that children can be warned and stock losses can be prevented. Cases of poisoning from plant material occur from time to time and widespread publicity is then given to the plant responsible.

← The yew should never be used for farm hedges, and trimmings from it should be burnt.

A GREAT many plants contain poisons and it would not be possible to do away with them. They are found not only in the flower garden as cultivated plants; there are also numerous poisonous weeds. Again, some of our food plants contain poisons even if not in the parts which are eaten, or at least not in the conditions under which they are grown for consumption. It is, for example, well known that potatoes when they have been exposed to sunlight and are green should not be eaten owing to the poison they then contain, and green potato tops are also poisonous; but who would suggest that we should no longer grow potatoes?

The greatest danger from poisonous plants is undoubtedly to domestic animals. Many cases of stock poisoning have been reported overseas, but in New Zealand the range of plants which have proved dangerous is not as great. This is probably due to our more favourable climate which allows better development of pasture plants throughout the year. Animals will often avoid poisonous plants when alternative fodder is available. However, primary industry is so important for New Zealand's economy that every step should be taken to safeguard animal health.

A knowledge of poisonous plants common in flower gardens is therefore desirable so that such plants are not planted where they can be eaten by stock.

The farming community is of course more conscious of this, but town dwellers, especially those possessing weekend baches, should give full consideration to the type of plant grown. Gardens which are visited only at intervals are frequently a source from where plants escape into the surrounding countryside.

Plant material, dead or alive, should never be disposed of indiscriminately. Poison may be present in the roots or in the dried tops. All unwanted plants and garden refuse should be composted or destroyed by burning.

The seed or fruits of plants that may be of particular interest to children are often poisonous. Children should therefore be taught that only the well known fruits may be eaten and that eating of other attractive berries or fruits may have disastrous results.

Poisonous plants are found among all kinds of plants and in many botanical families. Those described are grouped as they are normally considered in the gardens: herbaceous plants, bulbs, shrubs, trees, and climbers.

Herbaceous Plants

Probably the best known of the poisonous herbaceous plants is the foxglove, *Digitalis purpurea*. All parts of the plant are poisonous, also when dried.

Monkshood or aconite, *Aconitum napellus*, was recognised for its poisonous properties even by the Greeks and Romans. The degree of toxicity varies according to the state of growth and in the various parts of the plant, all of which, however, are poisonous.

The Japanese anemone, *Anemone japonica*, which belongs to the same family, is also poisonous, but that is not commonly known. Its poisonous principle is not active when the plant is dried.

Delphiniums and larkspurs, which are members of the ranunculus family, also have poisonous properties. One case is reported where 15 sheep died from eating *Delphinium consolida* plants which had been dug up from the garden and thrown over the fence, where the sheep could get them.

It is well known that opium is derived from a poppy, *Papaver somniferum*, but that is seldom grown in New Zealand. The Iceland poppy, *Papaver nudicaule*, which is grown throughout the country is also poisonous. Two cases of fatal sheep poisoning have been recorded in Australia, again where plants had been disposed of indiscriminately.

The flowering tobacco plants, *Nicotiana* spp., contain the same poison as commercial tobacco and care should be taken that plants are not allowed to become scattered.

All parts of lily of the valley, *Convallaria majalis*, are poisonous. The large fruits which occasionally develop can be very tempting to small children.

Blue lupins, *Lupinus angustifolius*, though not grown as an ornamental plant, are sometimes used for green cropping in the flower garden. The green pod and seeds as well as dry seeds are poisonous, but the foliage is not.

Many primula species can cause a skin rash to those susceptible to them.

Bulbous Plants

Cape tulip, *Homeria collina*, is the best known of the poisonous bulbous plants. It has become naturalised in various parts of the country, but is also grown as a garden plant.

It should be ruthlessly destroyed, not only because it is poisonous, but also because of its noxious habit. Each plant carries several flowers and each seed capsule contains a great number of small seeds which facilitate its quick spread. Once the corms have become established in pastures it is very difficult to eradicate. All parts of the plant are poisonous, also when dried.

Though irises, *Iris* spp., are not commonly regarded as dangerous, some cases of poisoning have occurred. The rarity of incidence is considered to be due to the acrid, bitter taste of the rhizomes and bulbs which deters animals from eating quantities of the plant.

Various *Narcissus* spp., daffodils and jonquils, have been reported to have caused stock losses overseas. This should be kept in mind when naturalising of these plants is contemplated. The animals reported to have been affected include cattle, goats, and pigs. A danger is that an inexperienced person might confuse the dried bulbs with onions, and even when the bulbs are cooked the toxic property remains in them.

Shrubs

Oleander, *Nerium oleander*, has been recognised as a poisonous plant from ancient times and many fatal incidents have been recorded. Wood, leaves, and flowers are all highly toxic.

Periwinkle, *Vinca major*, which belongs to the same family, has been suspected of causing stock losses. It should not be allowed to spread away from enclosed garden areas.

Rhododendrons, *Rhododendron* spp., have caused poisoning in sheep, cattle, horses, and goats, but in New Zealand these plants are seldom found growing in grazing areas. Stock losses here are mainly caused through animals eating garden clippings.

Cestrum, *Cestrum* spp., is frost tender and grown only in the warmer parts of the country. There have been several deaths in New Zealand through cattle eating plants of these species. Again, however, it is mainly a matter of their getting access to garden clippings. The whole of the plant is poisonous, and also when dried.

Another poisonous plant, grown mainly in the North Island, is the castor-oil plant, *Ricinus communis*, with the large decorative leaves and showy inflorescences. Both the foliage and the seeds are poisonous, the latter more so. The plant grows very easily from seed and can readily become established in the warmer parts of the North Island if seeds are allowed to become scattered.

The native rangiora, *Brachyglottis repanda*, is seldom eaten by sheep or cattle, but horses are sometimes attracted by the flower heads, which are the most toxic part of the plant. Lethal cases have been reported, but are not frequent, probably because quantities enough to cause death are seldom consumed.

It is fairly well known that *Daphne mezereum* is a poisonous plant; *D. cneorum* also has poisonous properties.

Buxus sempervirens, the old-fashioned box used for hedges and clipped specimens, has poisonous leaves and bark. Losses of stock have resulted from cattle browsing the hedges, but the greatest danger undoubtedly is the eating of clippings thrown out from the garden.

The common privet, *Ligustrum vulgare*, which is not infrequently grown in the South Island, should not be used for farm hedges. Fatal cases of poisoning are seldom reported, but both the leaves and berries are toxic and have caused deaths.

The Jerusalem cherry (*Solanum capsicastrum*) produces brightly coloured berries which are poisonous.

▼ Monkshood or aconite is a dangerous herbaceous plant.

[*Elliott*

There's MORE KILLING POWER in Aero-Blast

Kill flies, mosquitoes, ants, fleas, moths — all insects, quicker and easier than ever before with guaranteed Aero-Blast. Safe, easy, clean, quick.

ACCEPT NO SUBSTITUTES.
INSIST ON AERO-BLAST.

IT'S THE KILLING POWER INSIDE THE CAN THAT COUNTS!

TRIMORT
Aero-Blast
INSECT KILLER
KILLS THEM ON THE WING!

NON-POISONOUS
NON-IRRITATING

FLIES breed trouble don't give them a chance to breed at all

Plan an all-out campaign this summer against this airborne menace.

Houseflies lay their eggs in manure and in fermenting vegetable matter.

GRASS CUTTINGS are a favourite breeding spot. Care should be taken therefore to see that grass cuttings are:

1. **Placed in a properly constructed compost heap at once.**
2. **Covered with earth in a prepared trench. (This is good gardening practice).**
3. **Spread out to dry.**
4. **Put in a prepared pit and covered. (Sacking soaked in waste engine oil makes a good cover for this and also for the compost heap.**

Keep refuse of all kinds protected against flies. Half-hearted and incomplete measures are useless.

DESTROY ADULT FLIES WHEREVER YOU CAN

Use traps, fly poisons, sprays; also residual sprays on surfaces where flies rest or crawl—window frames and sills, hanging light fixtures and drop cords, edges and arches of doors, and on the rubbish tin, too.

If you want to dodge dysentery and summer sickness this summer keep all foodstuffs and eating utensils adequately covered.

Issued by the New Zealand Department of Health 10.2a

You're never less than very important . . .

Matson service is never less than perfect. There's so much more of everything . . . superb cuisine, full programme of entertainment, individually controlled air-conditioning, ships stabilised for your comfort. There's more space, more freedom, more of all good things . . . you're in America the moment you step aboard. All these things you take for granted on the Pacific's most experienced line.

Information and reservations from your local Matson Agent or

MATSON LINES
73 Queen St., Auckland. Phone 32-841

SAIL Matson

S.S. MARIPOSA / S.S. MONTEREY
Sailings every 3 weeks

23.9

Trees

The golden-chain tree, *Laburnum anagyroides*, is of particular danger to children attracted to it by the showy flowers and by the numerous seed pods. All parts of the plant are toxic, but the ripe seeds more so. Of animals, horses appear to be most susceptible to poisoning.

The yew, *Taxus baccata*, is also well known as a poisonous plant and it is another subject which should not be used for hedges or boundary planting on farms. The leaves, bark, and seeds are all poisonous, but the common cause of poisoning has been that stock have eaten the trimmings.

Kowhais, *Sophora* spp., should be treated with suspicion. Though no cases of stock poisoning can be attributed to kowhais, illness has followed eating with spoons made of kowhai wood. The Maoris used kowhai as a purgative.

Cape tulip may look very pretty in a paddock, but it is a great danger to stock.

Wattles, *Acacia* spp., should also be considered as a possible danger. Their leaves and seeds are suspected of having poisoned stock and poultry in Australia, and it is not advisable to allow stock free access to these trees.

The false acacia, *Robinia pseudacacia*, however, has been reported to cause deaths both in New Zealand and overseas. Losses appear to be most common in horses, but have been reported in cattle, sheep, and chickens. In America 32 boys were poisoned, but not fatally, from chewing the bark.

Macrocarpa, *Cupressus macrocarpa*, is suspected of being toxic to cattle.

The spindle tree, *Euonymus europaeus*, grown for its showy berries and autumn colouring, has poisonous bark, leaves, and fruit.

Cherry laurel, *Prunus laurocerasus*, is another poisonous plant used mainly for hedges. It is not very palatable

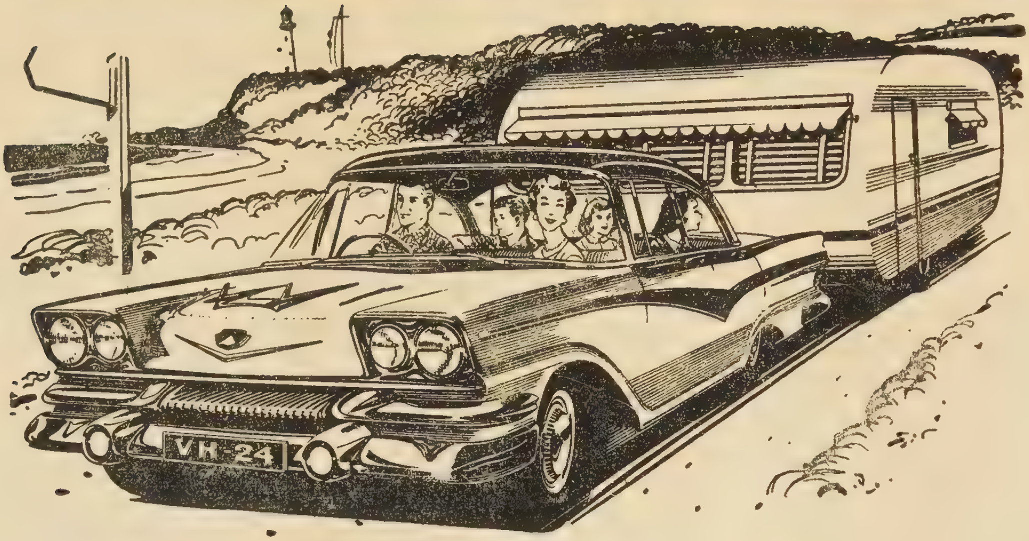
[*Elliott*

Iceland poppies are poisonous plants.

[*Elliott*

Daffodils should not be naturalised in grazing fields.

WARNING!
TO HOLIDAY MOTORISTS



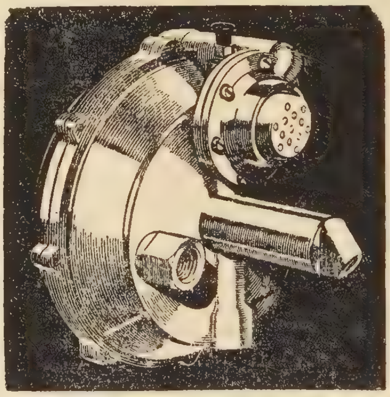
IF YOU HAUL A CARAVAN OR TRAILER BE SURE YOUR CAR BRAKES ARE RELIABLE

BY FITTING A **PBR** VH 24

POWER BRAKE

Ordinary car brakes were never designed to overcome the extra momentum or push caused by weighty caravans or trailers. Good drivers are no longer safe on our crowded highways unless equipped for the emergencies created by the recklessness of other motorists. Thousands of experienced drivers are now increasing the braking power of their cars with a VH24 Power Brake. A VH24 Power Brake will pay for itself time and again this summer, apart from the confidence it gives to a driver. Can be quickly installed in an hour or so on all cars having 4-wheel hydraulic brakes.

NOTE: A Power Brake will considerably improve the performance of override brakes. If you have a caravan or trailer, be sure your car brakes are reliable by fitting a P.B.R. VH24 Power Brake.



See your garageman today about the amazing new P.B.R. VH24 Power Brake or write to:

MOTOR SPECIALTIES LTD., P.O. Box 3201, Auck.
or
McMAHON MOTOR SUPPLIES LTD.,
P.O. Box 1340, Wellington.

The new P.B.R. VH24 Power Brake can be fitted to the average car for — **£28**

Available from:

BRAKE SERVICE STATIONS AND GARAGES EVERYWHERE

Manufactured by: PATONS BRAKE REPLACEMENTS PTY. Ltd. *(Division of Repco Ltd.) Melbourne, Australia.*

to stock and the greatest danger lies in clippings being made accessible to stock. Other members of this genus known to be poisonous are the apricot, *P. armeniaca*, of which the kernels are dangerous if eaten in quantity, while poisonous properties have been attributable to both seeds and young shoots of peaches, *P. persica*. Stock should therefore not be allowed into neglected orchards.

The native ngaio, *Myoporum laetum*, has caused frequent stock losses; the leaves appear to be the most toxic part of the plant. The greatest danger from this plant is when branches have broken off in a storm, particularly if a fall of snow has covered the normal pasture fodder.

There has been no poisoning reported from the Tasmanian ngaio, *M. serratum*, but from experimental work at the Department of Agriculture Animal Research Station, Wallaceville, it appears that it also is toxic, though less than the native species.

The fresh fruits of karaka, *Corynocarpus laevigata*, are poisonous, especially to man and dog, but when cooked they are quite safe to eat. They are well known as a Maori food of the past. The leaves are considered safe and have some fodder value.

The seeds of horse chestnuts (*Aesculus* spp.) are poisonous to humans, while the true sweet or Spanish chestnuts (*Castanea* spp.) are, of course, edible.

[*Elliott*

All parts of *Cestrum (habrothamnus)* are poisonous.

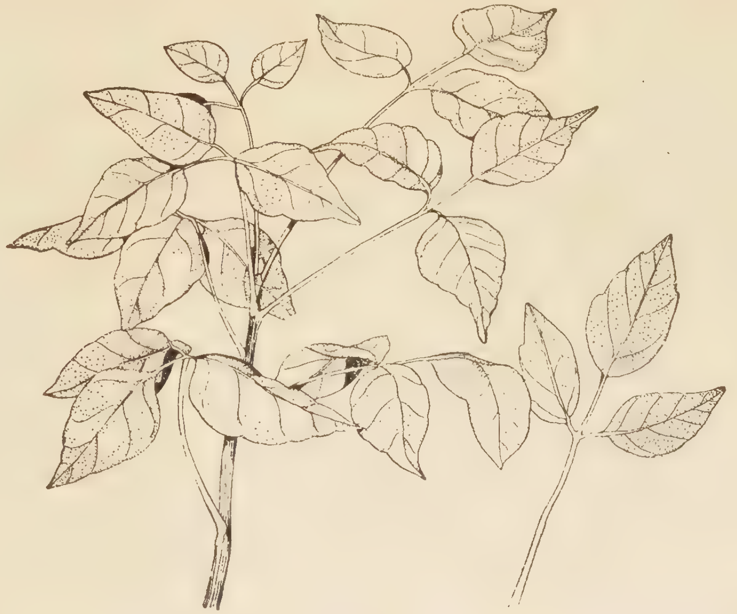
Climbers

The most poisonous climber is the poison ivy, *Rhus radicans*. It causes intense irritation to anyone coming in contact with it and should certainly never be grown.

The berries of English ivy, *Hedera helix*, have been considered poisonous from early times, but poisoning from leaves has also been reported.

German ivy, *Senecio mikanioides*, has also been reported to have caused poisoning and should not be allowed to spread in grazing areas. So-called "German ivy" grown as a house plant may not necessarily be this species; *S. macroglossus*, Cape ivy, is often sold as "German ivy". The greatest distinguishing difference between the two is in the flowers. They are yellow on both plants, but on German ivy they are small and insignificant, while on Cape ivy they are large and showy.

Travellers' joy, *Clematis vitalba*, has been reported to cause stock losses in England. It is not grown much as a garden plant here, but unfortunately it has become established in bush areas and could become a danger from the poisonous aspect as well as being the troublesome weed it is now.



[*N. M. Adams*

Poison ivy (*Rhus radicans*) is the most poisonous climber.

References

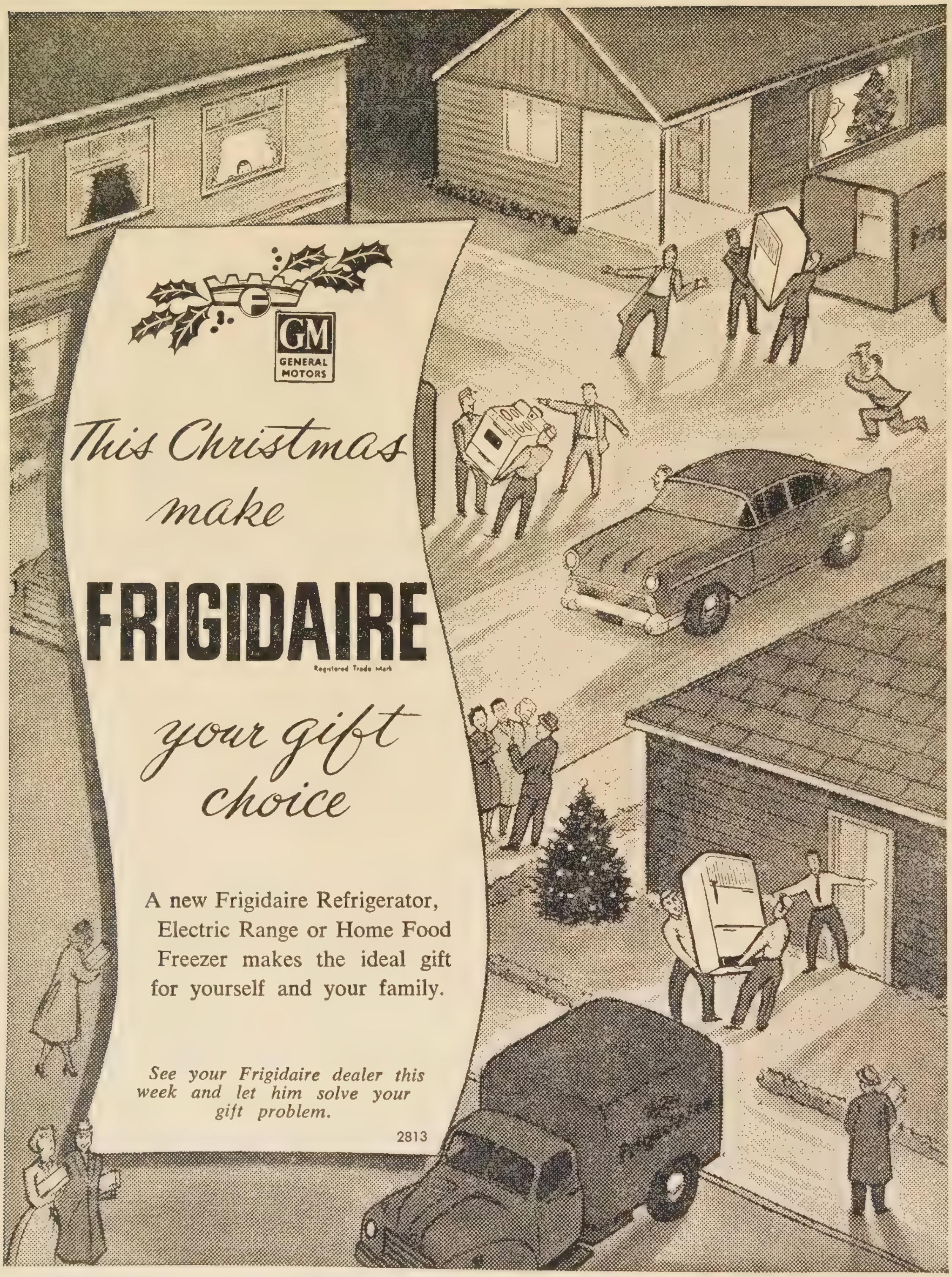
Two publications, both entitled "Poisonous Plants in New Zealand", by H. E. Connor, Botany Division, Department of Scientific and Industrial Research, have been used in preparation of this article; they are:

Bulletin No. 99, New Zealand Department of Scientific and Industrial Research.

Bulletin No. 356, New Zealand Department of Agriculture.

Both of these contain details of many of the plants dealt with in this article, both in regard to the poison they contain and to their identification.

They are recommended for further study.



GM
GENERAL MOTORS

This Christmas make

FRIGIDAIRE

Registered Trade Mark

your gift choice

A new Frigidaire Refrigerator, Electric Range or Home Food Freezer makes the ideal gift for yourself and your family.

See your Frigidaire dealer this week and let him solve your gift problem.

2813

Work for January

Gardens which have received good care, plenty of organic matter, and adequate soil nutrients should now be showing good growth and should not suffer unduly from neglect during the absence of the owners.

Preparations for Holidays

Upright herbaceous plants, and especially those with soft, sappy stems such as delphiniums and dahlias, should be strongly but inconspicuously staked to prevent damage from wind. Standard roses and flowering trees need more permanent supports such as angle iron or old water piping. Bamboo will provide stakes and brushwood to support a wide range of plants. Old nylon stockings, covered wire, raffia, and garden tape are all suitable materials for tying the plants to the supports.

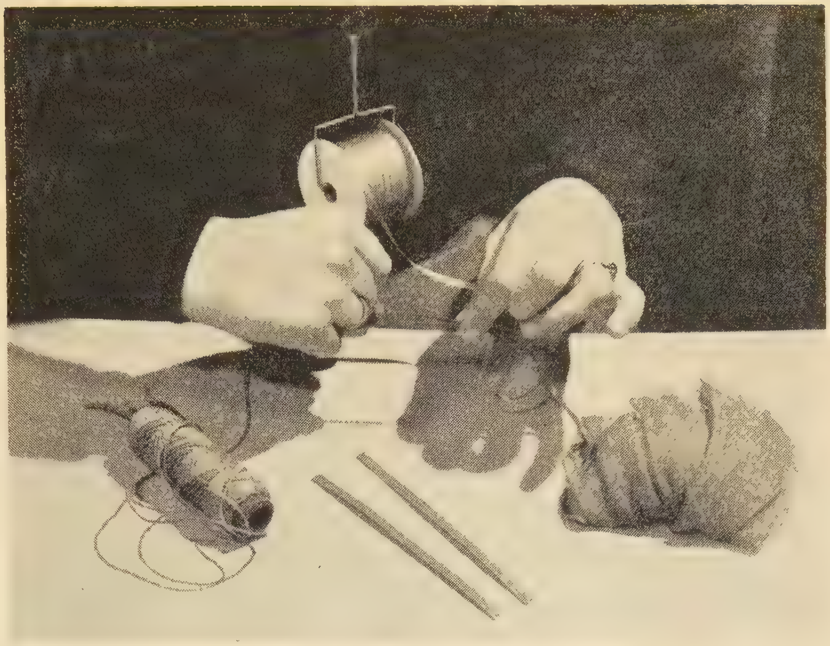
By ROSALIE A. CAMPION,
Horticultural Instructor,
Department of Agriculture,
Wellington

Mulching or Watering

Garden soils which have a high content of organic matter or which are covered with a mulch of organic matter are best able to withstand summer droughts. It is wise before going on holiday to give each part of the garden a thorough soaking with the hose and if possible immediately afterwards apply a mulch of compost, sawdust, or other organic matter to help retain the moisture. It is better to saturate the soil thoroughly than merely to sprinkle the surface, as this encourages the roots to develop near the soil surface. Mulches should not be applied to dry ground nor be heaped up against the stems of plants where they may encourage rotting.

New Season's Plantings

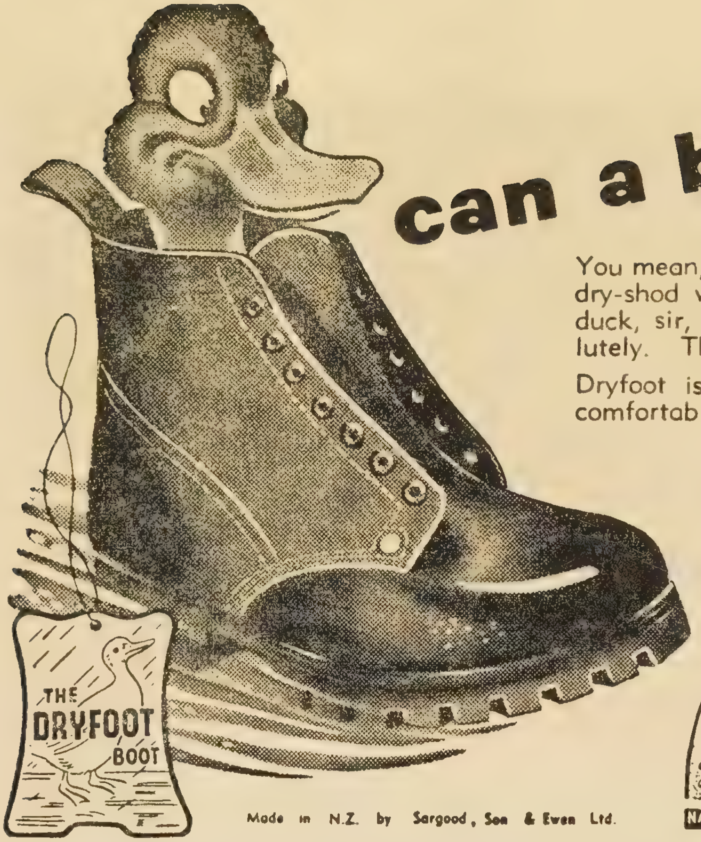
Trees, shrubs, and hedges established during the current season which do not appear to be thriving now are more likely to be in need of moisture than of fertilisers. Watering will encourage the growth of new roots, whereas a generous dressing of fertilisers, especially on dry soil, may damage the existing roots. Hosing down the foliage of plants such as yews and boronias which are attacked by red spider mites will also discourage trouble from this pest. Plants should be inspected for the presence



Materials for tying: string, which is best kept in a closed tin with a hole through which the string protrudes; paper-covered wire; nylon stockings, and garden tape. A ring cutter is being used to cut the tape.

▼ The bulbs of belladonna lilies can be planted now in a sunny situation.

[Orr

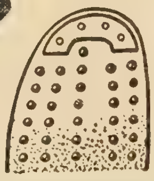


can a boot swim?

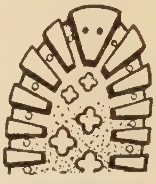
You mean, can you get a work boot that will keep you dry-shod while you're treading water? Lord love a duck, sir, Dryfoot boots live up to their name absolutely. They're interlined for water proofing.

Dryfoot is the toughest working boot made. Yet comfortable. Choice of three types of sole: Sherpa Commando rubber soles, nailed leather soles or Aviaflex rubber.

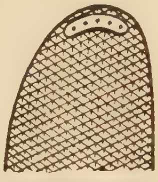
Whatever the weather, you'll get along swimmingly in Dryfoot—the boots with the duck on the tag.



NAILED LEATHER



SHERPA RUBBER



AVIAFLEX RUBBER

Made in N.Z. by Sargood, Son & Ewen Ltd.

D 9-1

WHEN YOU ARE
HAY MAKING . . .

Serve refreshments the easy way with SINGLE SERVICE PAPERWARE

Save yourself the necessity of carrying crockery and glasses into your fields . . . avoid the possibility of breakages . . . disperse with the necessity of washing up afterwards . . . you can cater for a large team of workers so very easily with SINGLE SERVICE PAPERWARE. All you need is a stack of hot cups, cold cups and a few paper plates. They're extremely economical, completely hygienic. Buy some today!

IDEAL TOO for all social gatherings, dances and all outdoor activities

Lily* cups

* *Regd. Trade Mark*

Distributed by:

FRANK M. WINSTONE (Merchants) LTD.

71-79 Customs Street East, Auckland.

South Island Representatives:
C.S. Agencies Ltd., 249 Moorhouse Avenue, Christchurch.

of pests and diseases and appropriate sprays applied.

Hormone Weedkillers

Hormone weedkillers can now be used to control weeds in actively growing lawns. The hormone 2,4,5-T can be used where clover is considered a weed, and MCPA can be used against flat weeds in preference to 2,4-D, which does greater damage to the grass. A mixture of

2 fl. oz of 2,4,5-T plus
1 fl. oz of MCPA

could be applied to 100 sq. yd. and immediately followed by an application of fertilisers.

At this time gorse seedlings and regrowths of gorse (at least 1 ft high) and of blackberry can be controlled by saturating the plants with 2 or 3 standard teaspoons of 2,4,5-T in 3 gallons of water.

Convolvulus is one of the many plants which can be killed by spraying with standard rates of 2,4-D. Regrowths should be allowed to develop fully before a second treatment is given.

Hormones should be used only on a very calm day and the spray pump should be thoroughly washed out immediately afterward. New washers should be inserted before this equipment is used for disease and pest control sprays, but it is safer to have separate equipment for each purpose.

[Elliott

Haemanthus coccineus, a South African plant which flowers before the leaves appear. It should be planted with the neck of the bulb just below the surface in a well drained position which gets the late morning sun.

In the Flower Beds

Light cultivation should be continued with the dual purposes of suppressing weeds and conserving moisture. The dead flower heads of most plants including sweet scabious, gerberas, and *Bellis perennis* should be removed as they develop. By this time plants of *Bellis perennis* which have flowered through from the spring may be deteriorating, at which stage they are most prone to attack by the rust fungus. Healthy plants can be divided up and replanted, but it is generally better to plant young seedlings in autumn. As the seeds are often cross pollinated with the common lawn daisy, it is best to buy seed for sowing now.

Attention to Shrubs

The Australian bottlebrush *Callistemon citrinus* will generally be finished flowering and should be pruned now. This shrub usually makes new growth beyond the flower head and becomes very straggly as the long, thin branches develop. By cutting off the flower heads, trimming back straggly growth, and watering well a more compact bush will be developed. Most other shrubs which have finished flowering will be improved by having the old flower heads trimmed off.

Shoots of shrubs should be inspected periodically for insects, principally scales and thrips. Sprays of malathion or summer oil plus nicotine sulphate should be used to control these. If the holes of boring insects are found, petrol could be injected into the holes, which should then be sealed with petroleum jelly or clay. The insect which causes the blackening or "blight" on manukas often does severe damage before its natural enemies are present in sufficient numbers to control it. It is therefore desirable to spray the plants as soon as the trouble is noticed with emulsion forms of DDT, lindane, or malathion.

Lawn Clippings and Compost

Lawn clippings can be mixed with sawdust to provide the main ingredients of a compost heap. The clippings contain some nitrogen, which is necessary when sawdust is being used.

Compost heaps which have been completed for a few weeks can be thoroughly mixed while being turned into the next bin. If the material is rather dry, water should be added as the heap is rebuilt to hasten decomposition. One turning of a heap is usually enough to produce well rotted compost, but if much twiggy or fibrous material is being used, it may be necessary to turn the heap twice.

As sources of organic matter tend to become scarcer efforts to compost all available plant refuse will be worth while and the establishment of permanent concrete bins should be considered.

Bulbs

The main bulb planting time is during February and March, but sometimes storage conditions induce the early development of roots and shoots. Some watsonias are particularly prone to this and all stored bulbs should be examined and planted if growth has started.

Some of the South African bulbs, including *Amaryllis belladonna*, haemanthus, brunsvigia, and cyrtanthus, flower between January and March and before the leaves appear. These should be planted immediately so that the bulbs will be established before flowering; otherwise this year's bloom may be affected. When planted they should be well watered to encourage root formation. The soil should be well prepared before planting by the incorporation of compost and bonedust at 3 oz per square yard. If the soil is very heavy, sand should also be added.

FLOWER GARDEN WORK FOR JANUARY

[*Elliott*

***Freesia burtoni*, a New Zealand variety, is the biggest and best of the cream varieties. Bulbs can be planted now in pots for flowering indoors.**

Cutting Time

The development of new plants has a fascination of its own and for this hobby January is an important month. Cuttings of many shrubs can now be be taken and rooted in sharp sand. Cuttings from fine-leaved plant material such as ericas, manukas, eriocephalus, coleonema, or boronia can be quite small, 1 to 2 in. being enough. They can be with or without a heel and the leaves from the bottom half of the cutting should be removed before insertion. Larger-leaved plants such as *Daphne odora*, photinia, abutilon, and eriostemon can be grown from cuttings 3 to 4 in. long. Rooting hormones can be used to hasten rooting.

While the cuttings have no roots through which to obtain their moisture it is important to place the cuttings in a humid atmosphere to reduce the loss of moisture from the leaves. The use of a closed frame, frequent syringing, or better still the enclosure of containers of cuttings in a polythene bag will help maintain these humid conditions.

Seedlings

Boxed seedlings should not be allowed to dry out during hot weather.

Seed of spring flowering plants including Brompton stocks, cinerarias, myosotis, pansies, and Iceland poppies can now be sown. The boxes should be covered with glass and newspaper and then placed in a shaded position to prevent the mixture from drying out.

As early flowering annuals fade their place can be taken by nemesia, calendula, antirrhinums, Canterbury bells, or stocks.

Glasshouse

Bulbs of lachenalia and freesias can be potted up for flowering early next spring. An open mixture or commercial bulb fibre can be used.

Hydrangeas for flowering in pots indoors can be started from cuttings taken now. The cuttings should be 3 to 4 in. long, cut just below a leaf joint (node), and have the bottom pair of leaves removed.

A humid atmosphere should be maintained in the glasshouse and this will necessitate hosing down the floor and bench surfaces several times each day. The ventilators should be opened up each morning, and in very hot weather it is best to leave them partially open overnight. Seed of calceolarias and *Primula malacoides* can now be sown.

General

On rambler roses the shoots which have flowered should be cut out and all new growths should be tied out of the way of the wind. Rose blooms should be cut as they fade. If a late autumn flush of roses is desired, the bushes should not be watered now and blooms should be removed with short stems.

Old cyclamen corms can be potted up now and started into growth in a cool position.

Healthy carnation plants can now be layered and cuttings can also be taken.

Chrysanthemums will be growing strongly and staking and extra feeding can be attended to. Late-flowering varieties can be stopped once more.

Most hedges can now be trimmed and the clippings can be composted. Hedges should be shaped with the broadest part at the bottom or otherwise the bottom part will tend to become thin and may die out.

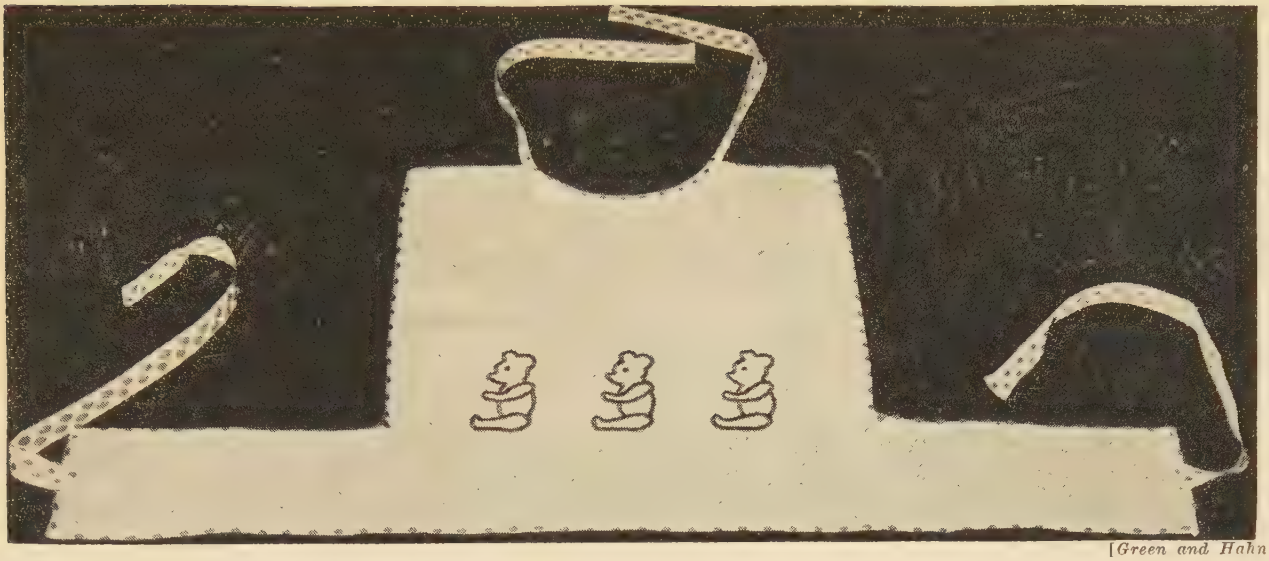
Mildew may be troublesome on many plants and sprays of "Karathane" or colloidal sulphur can be used to control this.

Dahlias should be sprayed with DDT emulsion to control thrips or with malathion if leaf rollers are present as well. If exhibition blooms are desired, extra feeding should be given to the moist soil.

Lavender can be harvested when it is in full bloom. With the many sweetly scented plants now in bloom "pot pourri" can be made.

Bearded iris can now be planted out and lilies could be transplanted after blooming.

A Child's Tie-round Feeder is Easy to Make



[Green and Hahn

WITH a little imagination odd pieces from the scrap bag can make useful and attractive articles suitable either for use in the home or for small gifts. Such an article is the child's tie-round feeder described here by Judith Ferrier, Home Science Instructor, Department of Agriculture, Christchurch.

THIS tie-round feeder is securely anchored round the waist so that any food spilt on it cannot be wiped where it should not be during the struggles and arm wavings which sometimes accompany the meal.

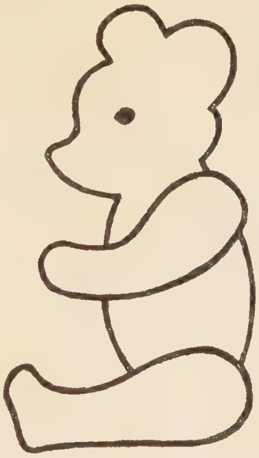
Materials

Suitable fabrics are huckaback linen, terry towelling, fine linen or cotton. Other requirements are stranded cotton for the embroidery or an applique design if terry towelling is used, and 3¼ yd of decorative tape (½ in. to ¾ in. wide) to bind the feeder and make the ties.

The feeder may be backed with clear plastic to make it completely food and liquid proof.

▲ The extra side pieces tie round the child's waist.

▼ Teddy bear pattern, actual size. Use carbon paper to trace the pattern on to greaseproof paper, and from there on to the feeder.



To Make up

With the straight of the material running lengthwise in each piece cut one rectangle 11¼ in. long and 10½ in. wide and two side pieces each 2¾ in. long and 6½ in. wide.

Three feeders with slightly narrower side pieces can be made from ⅜ yd of 36 in. fabric.

With a narrow seam join one side piece, narrow end, to the bottom of each 11¼ in. side of the main piece. Overcast the raw edges if the material is liable to fray.

Cut out the neckline on the top short edge.

Turn a narrow hem once only on to the right side of the feeder and catch down with running stitches all round.

Bind the edge with the tape, taking care to cover all the raw edges. Attach ties at the neck and at the ends of the side pieces.

Teddy Bear Motif

With carbon paper trace the teddy bear motif from the pattern at left on to greaseproof paper. Use a new sheet of carbon paper to transfer the design on to the feeder. Take care not to smudge finger marks through. The bears should be carefully aligned and evenly spaced with the two outside ones an equal distance in from the edge.

Use stranded cotton in a dark colour to outline the bears in stem or satin stitch and give each a French knot to mark the eye.

Press very well.

New Zealand Journal of Agriculture

Index to Volume 99, July-December 1959

July 1-96, August 97-192, September 193-296, October 297-400, November 401-504, December 505-608

A
Accounts, Farm, 57.
Ahuwhenua Trophy for Maori Farmers, 459.
Aldrin and Dieldrin Scheduled as "Noxious Substances", 36.
Allan, J. E., Pioneer Work of, in Spectrography, 441.
Allen, J. D., Smith, H. C., and Hurndell, L. C.—Control of Onion White Rot by Seed Pelleting, 531.
Allo, A. V.—
  Maori Farming, 459.
  Paspalum Silage, 427.
Anderson, H., Retirement of, 102.
Apiary Sites, Domestic, Selection of, 255.
Appetisers and Hors d'oeuvres, 394.
Apple, Powdery Mildew of, 53.
Apple Trees, Dwarf, 127.
Apricots and Peaches, Hormone Application to, 353.
Apricots, Newcastle, Zinc Deficiency of, 585.
Armstrong, M. C.—Unthriftiness of Lambs in South Canterbury, 335.
Army Worm Control in Maize Crops, 521.
Autumn-saved Grass in South Canterbury, 519.
Ayson, E. C.—Mob Stocking of Ewes at Weaning, 338.

B
Baconers, Premium for, 453.
Bacon Recipes, 291.
Banks, Graded Drainage, Surface Drainage and, 576.
Barley Production, 63.
Barrer, P. R.—Harvesting Peas, 521.
Baumgart, M. G.—Automatic Control of Trickle Irrigation, 30.
Baumgart, M. G., Piper, B. M., and Fletcher, W. A.—Storage of Chinese Gooseberries, 15.
Bedside Lamp, Making a, 82.
Bee Combs, Old, Steam Plant for Rendering, 43.
Beef and Lamb Production from Different Stocking Systems, 243.
Beef Production, Hexoestrol for, 360.
Beehives, Control of Grass Round, 449.
Beekeeping, Domestic, Notes, 255, 369, 449, 551.
Beet, Fodder, 104.
Beggs, J. P., and Leonard, W. F.—Spanish Heath, 417.
Begonias, 383.
Bennett, A. W.—Honey Gate Fitting for Transfer of Honey from One Tank to Another, 277.
Bennetts, R. L., and Lobb, W. R.—Fertiliser Responses on Plains Soils of Canterbury, 317.
Bennetts, R. L.—Pasture Oversowing on Tussock Country, 27.
Bib and Traycloth Set, 290.
Biscuit Recipes, 83.
Blackberry, Spraying, 521.
Blick, C. M.—Control of Crickets in Pasture, 458.
Blight, Manuka, Losing Effectiveness in North Island, 119.
Bloat in Dairy Cows, 2.
Blouse, Summer, 503.
Blue Lupins, 147.
Bobby, F. C., and Edmondson, J.—Dehydrated Lucerne Meal as Source of Vitamin A for Laying Pullets, 341.
Book Reviews, 56, 164, 248, 337, 522, 573.
Booth, A. K.—
  Tainui and Gabo Wheat Trials in Rangitikei, 519.
  Wheat Varieties for North Island, 27.
Border Dike Irrigation and Fertiliser Placement on Lucerne, Effects of, 553.
Boron for Swedes and Lucerne, 339.
Boyer, M. G.—
  Control of Twin Cress in Dairy Pastures, 327.
  Insect Pests of Seedling Brassica Crops, 102.
  Spraying Blackberry, 521.
Brassica Crops, Seedling, Insect Pests of, 102.
Brassica Crops, Spurrey Control in, 115.
Briscoe, D. A.—Domestic Beekeeping Notes, 255, 369, 449, 551.
Brown, I. M. L., and Watts, I. M.—*Didymella* Stem Rot in Nelson, 583.
Brumby, P. J.—Relationship of Inheritance and Environment to Herd Production, 194.
Bull, H. McM.—
  Chou Moellier for Facial Eczema Control, 372.
  Redroot in Chou Moellier Controlled with MCA, 573

C
Cage System, Automatic Laying, of Egg Production, 249.
Cairney, I. M.—Trace Mineral Deficiencies and Current Stock Health Investigations, 433.
Calcium in Plant Tissues, Effect of Potassium Fertiliser on, 442.
Californian Thistle, 313.
Calves, Rearing, on Milk Substitutes, 141.
Calving Percentage, High, in Hill Country Cattle, Achieving, 235.
Cameron, M. L.—
  Linen Flax, 565.
  Management of Weaned Lambs, 521.
Cameron, Professor H. S., Visit to N.Z. of, 333.
Campbell, Eleanor S.—Jams, Jellies, and Conserves, 497.
Campbell, I. L.—Rearing Calves on Milk Substitutes, 141.
Campion, Rosalie A.—Flower Garden Work for August, 95; for September, 187; for October, 283; for November, 391; for December, 493; for January, 601.
Canterbury, Fertiliser Responses on Plains Soils of, 317.
Canterbury Mixed Farms, Better Feeding of Ewe Flocks on, 298.
Canterbury, South, Autumn-saved Grass in, 519.
Canterbury, South, Unthriftiness of Lambs in, 335.
Cappings Press for Heavy-bodied Honeys, 465.
Cardigan, Small Boy's, 191.
Cast-for-age versus Mixed Age Ewes in Fat Lamb Production, 378.
Cattle, Hill Country, Achieving Health and High Calving Percentage in, 235.
Cattle Numbers, World, in 1958, 333.
Cereal Growing in Waikato, 225.
Cereals, Sod Seeding, into Pasture for Winter Green Feed, 480.
Cereals, Weed Control in, 138.
Chamberlain, H. de O.—Saving Feed for Lamb Weaning, 327.
Chick Nursery Coop, 443.
Child's Tie-round Feeder, 605.
Chinese Gooseberries, Storage of, 15.
Chou Moellier, Feeding out of, to Dairy Cows, 534.
Chou Moellier for Facial Eczema Control, 372.
Chou Moellier Harvesting, 521.
Chou Moellier, Redroot in, Controlled with MCA, 573.
Christie, C. J.—Turnips for Summer Feed, 125.
Citrus Fruit Growing, Survey of, 439.
Citrus Orchard Nutrition and Soil Management, 73.
Clamps, Silage, Covering, with Sawdust, 437.
Clover Case-bearers, 523.
Cobalt Deficiency and Stock Health, 433.
Cobb River Dam Development in Nelson, 203.
Cocksfoot Stands, Leatherjacket Damage to, 571.
Codling Moth, Control of, 477.
Collin, F. H.—Control of Potato Tuber Moth, 339.
Colour Schemes, Kitchen, 590.
Combs, Honey, Repairing, 467.
Composts, N.Z. Peats Suitable in, 287.
Concentrates, Feeding, to Milking Cows, 153.
Congdon, N. B., and Morrison, L. G.—Mealy Bug in Hawke's Bay, 481.
Conserves, Jams, and Jellies, 497.
Coop, Chick Nursery, 443.
Copper Deficiency and Stock Health, 435.
Cottier, K.—Thiram as Seed and Ripening Grain Protectant, 103.
Coughlan, A. J.—Grass Grub Control, 170.
Couston, Eleanor—
  Kitchen Colour Schemes, 590.
  Spinach, 502.
Cows, Dairy, Bloat in, 2.
Cows, Milking, Feeding Concentrates to, 153.
Crawford, W. R.—Closing Paddocks for Silage, 264.
Crickets in Pasture, Control of, 458.
Crop and Pasture Production, 27, 327, 427, 521.
Crop and Seed Production, 223.
Crop Production:
  Barley, 63.
  Blue Lupins, 147.
  Linseed and Linen Flax, 561.

D
Dairy Farming in Kaikoura, 506.
Dairy Herd, Keeping the, Healthy, 105.
Dairy Produce Graded for Export during March, 52; during April, 112; during May, 276; during June, 332; during July, 480; during August, 576.
Dairy Products in N.Z., Consumption of, 525.
Darwin, R. K.—Resowing Depleted Tussock Land in Hakataramea Valley, 17.
Davies, D. J. G.—
  Fodder Beet, 104.
  Sod Seeding Cereals into Pasture for Winter Green Feed, 480.
  Summer Supplementary Feeds, 223.
Dehydrated Lucerne Meal as Source of Vitamin A for Laying Pullets, 341.
Dehydration of Young Stock, Deaths from, 171.
Delahunty, E.—
  Control of Nodding Thistle, 206.
  Linseed, 561.
Diagnostic Station, Veterinary, to be Established at Taieri, 359.
Didymella Stem Rot of Tomatoes, Control of, 577.
Dieldrin and Aldrin Scheduled as "Noxious Substances", 36.
Dipping Materials, Modern, Proper Use of, 428.
Domestic Apiaries, Selection of Sites for, 255.
Domestic Beekeeping Notes, 255, 369, 449, 551.
Domestic Hives, Shifting, 255.
Doutre, J. L., and Gunning, B. A.—Forage Harvester System of Making Silage or Hay, 409.
Drainage Banks, Graded, Surface Drainage and, 576.
Drainage, Surface, and Graded Drainage Banks, 576.
Drainpipes, Tile, Arrangement of, to Divert Spring into Drainage System, 138.
Drake, C., Grant, A. B., and Hartley, W. J.—Selenium and Animal Health, 259.
Drip Stews, 182.
Dumbleton, L. J.—Clover Case-bearers, 523.
Duncan, J. E.—
  Dipping of Sheep, 428.
  Phenothiazine Wool Stain, 113.
Dusting and Spraying of Sheep, Safety Precautions for, 469.
Dwarf Apple Trees, 127.

E
Ebert, A. J.—Weed Control in Cereals, 138.
Edmondson, J., and Bobby, F. C.—Dehydrated Lucerne Meal as Source of Vitamin A for Laying Pullets, 341.
Edmondson, J.—High-energy Poultry Mashes, 135.
Edwards, E. D.—1959 Pig Carcass Competitions, 513.
Egg Production, Automatic Laying Cage System of, 249.
Elliott, I. L.—Cereal Growing in Waikato, 225.
Environment and Inheritance, Relationship of, to Herd Production, 194.
Everitt, G. C.—Trials with Hexoestrol for Beef Production, 360.
Ewe Flocks on Mixed Farms in Canterbury, Better Feeding of, 298.
Ewes, Effects of Hogget Mating on Lifetime Performance of, 537.
Ewes, Mixed Age versus Cast-for-age, in Fat Lamb Production, 378.
Ewes, Mob Stocking of, at Weaning, 338.
Explosives, Safe Handling of, 159.

F
Facial Eczema Control, Chou Moellier for, 372.
Facial Eczema, Isolation of Poison Causing, 511.
Facial Eczema Research, 303.
FAO World Census of Agriculture, 1960, 584.
Farm Accounts, 57.
Farm Dairy Instruction Service, 139.
Farm Improvement on North Otago Downlands, 10.
Farm Production Statistics in 1960, 584.
Fat Lamb Production, Mixed Age versus Cast-for-age Ewes in, 378.
Feeder, Child's Tie-round, 605.
Feed, Mature, Saving, for Hoggets, 447.
Ferrier, Judith—
  Child's Tie-round Feeder, 605.
  Drip Stews, 182.
  Duck Glove Puppet, 288.
  Keeping the Tins Full, 83.
Fertiliser Placement and Border Dike Irrigation on Lucerne, Effects of, 553.
Fertiliser, Potassium, Effect of, on Sodium, Magnesium, and Calcium in Plant Tissues, 442.
Fertiliser Responses on Plains Soils of Canterbury, 317.
Fertility Problems of Marginal Areas of South Island, 207.
Fielden, E. D., and McFarlane, D.—Achieving Health and High Calving Percentage in Hill Country Cattle, 235.

Filmer, J. F.—Facial Eczema Research, 303.
Film, "We Lead the World", 468.
Flax, Linen, 565.
Fletcher, W. A., Baumgart, M. G., and Piper, B. M.—Storage of Chinese Gooseberries, 15.
Fletcher, W. A.—
  Citrus Orchard Nutrition and Soil Management, 73.
  Survey of Citrus Fruit Growing, 439.
  Survey of Subtropical Fruit Orchards, 570.
Flower Displays for Hospitals, 296.
Flower Garden Notes, 89, 183, 278, 383, 488, 594.
Flowers, Transporting, 296.
Fodder Beet, 104.
Fodder Crop Production, 125.
Forage Harvester System of Making Silage or Hay, 409.
Fruit Growing, Citrus, Survey of, 439.
Fruit Pimpling of Nectarine and Peach, 423.
Fruit, Subtropical Orchards, Survey of, 570.

G
Gabo and Tainui Wheat Trials in Rangitikei, 519.
Garden, Flower, Notes, 89, 183, 278, 383, 488, 594.
Garden, Home, Notes, 49, 173, 271, 347, 473, 543.
Garden Walls, 183.
Glove Puppet, Duck, 288.
Gloves, Leather, Washing, 400.
Graham, J. A.—Planned Development of Manawatu Hill Country Farm, 402.
Grain, Ripening, Protectant, Thiram as, 103.
Grant, A. B., Hartley, W. J., and Drake, C.—Selenium and Animal Health, 259.
Grass, Autumn-saved in South Canterbury, 519.
Grass Grub Control, 170.
Green Feed, Winter, Sod Seeding Cereals into Pasture for, 480.
Guard for Heater, 88.
Gunning, B. A., and Doutre, J. L.—Forage Harvester System of Making Silage or Hay, 409.
Gunning, B. A.—
  Army Worm Control in Maize Crops, 521.
  Maize for Green Feed, 223.

H
Haddow, G. B.—Covering Silage Clamps with Sawdust, 437.
Hadfield, W. V., Appointed Assistant Fields Superintendent at Christchurch, 530.
Hadfield, W. V., Assistance of, to Japanese Government, 381.
Hakataramea Valley, Resowing Depleted Tussock Land in, 17.
Hamblyn, C. J.—Manuka Blight Losing Effectiveness in North Island, 119.
Harrowing of Pastures, 27.
Hartley, W. J., Drake, C., and Grant, A. B.—Selenium and Animal Health, 259.
Harvester, Forage, System of Making Silage or Hay, 409.
Hawke's Bay Orchards, Mealy Bug in, 481.
Hay, Forage Harvester System of Making, 409.
Heater, Guard for, 88.
Heemstra, L. C., Visit of, 32.
Herd, Dairy, Keeping the, Healthy, 105.
Herd Production, Relationship of Inheritance and Environment to, 194.
Herds, High- and Low-producing, Management of, 198.
Hexoestrol for Beef Production, 360.
Hill Country Cattle, Achieving Health and High Calving Percentage in, 235.
Hives, Diseased, Destroying, 369.
Hives, Domestic, Shifting, 255.
Hives, Domestic, Spring Examination of, 369.
Hive Ventilation, Importance of, 551.
Hockey, K. C.—Runner Development of Redgauntlet Strawberry Plants Stimulated by Cool Storage, 104.
Hogg, D. E.—Soil Advisory Test for Potassium, 47.
Hogget Mating, Effects of, on Lifetime Performance of Ewes, 537.
Hoggets, Saving Mature Feed for, 447.
Holland, M. K.—Harrowing of Pastures, 27.
Home Garden Notes, 49, 173, 271, 347, 473, 543.
Home Orchard in Spring, 161.
Home Orchard in Summer, 477.
Honey Combs, Repairing, 467.
Honey, Domestic Section Comb, Production of, 449.
Honey Flow, Colony Requirements during, 551.
Honey Gate Fitting for Transfer of Honey from one Tank to Another, 277.
Honey, Heavy-bodied, Mechanical Pricker for Extracting, 329.
Honeys, Heavy-bodied, Cappings Press for, 465.
Hormone Application to Apricots and Peaches, 353.
Hormone, Hexoestrol, for Beef Production, 360.
Hormone Weedicides for Control of Ragwort on Dairy Farms, 21.
Hors d'oeuvres and Appetisers, 394.
Hurndell, L. C., and Smith, H. C.—Control of *Didymella* Stem Rot of Tomatoes, 577.
Hurndell, L. C., Smith, H. C., and Allen, J. D.—Control of Onion White Rot by Seed Pelleting, 531.

I
Ill Thrift and White Muscle Disease, 559.
Inheritance and Environment, Relationship of, to Herd Production, 194.
Insect Pests of Seedling Brassica Crops, 102.
Invermay Investigations of Hogget Mating, 537.
Iodine Deficiency and Stock Health, 435.
Irrigated Lucerne, Lime, Superphosphate, and Potash on, 345.
Irrigated Pastures at Winchmore, Responses to Phosphate and Sulphur on, 269.
Irrigation, Border Dike, and Fertiliser Placement on Lucerne, Effects of, 553.
Irrigation Committee 1959, Report of, 301.
Irrigation, Trickle, Automatic Control of, 30.
Irving, M. R., Visit of, to N.Z., 468.

J
Jamieson, S., Appointed Chief Advisory Officer (Infectious Diseases Control), 416.
Jamieson, S., Visit to Manila of, 542.
Jams, Jellies, and Conserves, 497.
Johns, A. T.—
  Bloat in Dairy Cows, 2.
  Facial Eczema Research, 306.
Jolly, R. G.—
  Alternative Winter Feeds, 327.
  Lucerne Seed Crop, 427.
Jones, J. H.—Automatic Laying Cage System of Egg Production, 249.
Josland, P.—Chick Nursery Coop, 443.
"Journal of Agriculture" Cookery Book, Second, 593.

K
Kaikoura, Dairy Farming in, 506.
Kemp, W. S., and Wilson, D. W.—Hormone Application to Apricots and Peaches, 353.
Kemp, W. S.—
  Yellow Leaf Spot and Fruit Pimpling and Cracking of Nectarine and Peach, 423.
  Zinc Deficiency of Newcastle Apricots, 585.
Kennelly, A. G.—Home Garden Notes, 49, 173, 271, 347, 473, 543.
Kitchen Colour Schemes, 590.

L
Lamb and Beef Production from Different Stocking Systems, 243.
Lambs, Unthriftiness of, in South Canterbury, 335.
Lambs, Weaned, Management of, 521.
Lamb Weaning, Saving Feed for, 327.
Lammerink, J.—
  Effects of Border Dike Irrigation and Fertiliser Placement on Lucerne, 553.
  Lime, Superphosphate, and Potash on Irrigated Lucerne, 345.
  Responses to Phosphate and Sulphur on Irrigated Pastures at Winchmore, 269.
Landrace Pigs for Breeding at Ruakura, 338.
Laying Cage System, Automatic, of Egg Production, 249.
Leaf Spot, Yellow, of Nectarine and Peach, 423.
Leatherjacket Damage to Cocksfoot Stands, 571.
Leonard, W. F., and Beggs, J. P.—Spanish Heath, 417.
Leonard, W. F.—Control of Rushes, 427.
Le Souef, D. H.—Dehydration of Young Stock, 171.
Lewis, K. H. C.—Hogget Mating, 537.
Lime Deficiency of Marginal Areas of South Island, 221.
Lime, Superphosphate, and Potash on Irrigated Lucerne, 345.
Linen Flax, 565.
Linseed, 561.
Livestock, Care of, during August, 26; during September, 124; during October, 222; during November, 326; during December, 426; during January, 520.
Livestock Numbers by Land Districts, 575.
Lobb, W. R., and Bennetts, R. L.—Fertiliser Responses on Plains Soils of Canterbury, 317.
Lobb, W. R., Appointed Superintendent at Winchmore, 264.
Lobb, W. R.—Fertility Problems of Marginal Areas of South Island, 207.
Longwill, A.—Early Weaning of Pigs, 453.
Lucerne and Swedes, Boron for, 339.
Lucerne, Effects of Border Dike Irrigation and Fertiliser Placement on, 553.
Lucerne-grass Mixtures, 427.
Lucerne, Irrigated, Lime, Superphosphate, and Potash on, 345.
Lucerne Meal, Dehydrated, as Source of Vitamin A for Laying Pullets, 341.
Lucerne Seed Crop, 427.
Lucerne Sowing, 327.
Lunn, W. A.—Lucerne-grass Mixtures, 427.
Lupins, Blue, 147.
Lyons, Christine—Guard for Heater, 88.

M
McCallum, D. W.—
  Home Orchard in Spring, 161.
  Home Orchard in Summer, 477.
McFarlane, D., and Fielden, E. D.—Achieving Health and High Calving Percentage in Hill Country Cattle, 235.
McFetridge, M. J.—
  Cleaning Farm Vats Used for Tanker Collection of Milk, 29.
  Farm Dairy Instruction Service, 139.
McLeod, C. C. S.—Autumn-saved grass in South Canterbury, 519.
McNaught, K. J.—Effect of Potassium Fertiliser on Sodium, Magnesium, and Calcium in Plant Tissues, 442.
McPherson, G. K., Appointed Fields Superintendent at Dunedin, 52.
McSweeney, B. J.—Harvesting Ryegrass, 510.
Magnesium in Plant Tissues, Effect of Potassium Fertiliser on, 442.
Maize Crops, Army Worm Control in, 521.
Maize for Green Feed, 223.
Manawatu Hill Country Farm, Planned Development of, 402.
Manganese Deficiency of Marginal Areas of South Island, 219.
Manuka Blight Losing Effectiveness in North Island, 119.
Maori Farming, 459.
Marcussen, K. H.—
  Garden Walls, 183.
  Poisonous Plants in Flower Garden, 594.
Marginal Areas of South Island, Fertility Problems of, 207.
Mashes, High-energy Poultry, 135.
Mason, G.—Dairy Farming in Kaikoura, 506.
Matthews, L. J.—Californian Thistle, 313.
Mayo, K. L.—Arrangement of Tile Drainpipes to Divert Spring into Drainage System, 138.
MCA, Redroot in Chou Moellier Controlled with, 573.
Mealy Bug in Hawke's Bay Orchards, 481.
Meat, Roasting, 179.
Mechanical Pricker for Extracting Heavy-bodied Honey, 329.
Merry, D. M. E.—Crops for Pigs, 125.
Meteorological Records for May, 46; for June, 140; for July, 234; for August, 344; for September, 408; for October, 522.
Mildew, Powdery, of the Apple, 53.
Milk, Cleaning Farm Vats Used for Tanker Collection of, 29.
Milk Substitutes, Rearing Calves on, 141.
Mineral Deficiencies, Trace, and Stock Health, 433.
Minister of Agriculture, Statements by, 359, 511.
Minister of Agriculture, U.K., in N.Z., 471.
Mixed Age versus Cast-for-age Ewes in Fat Lamb Production, 378.
Mixed Farms, Canterbury, Better Feeding of Ewe Flocks on, 298.
Mob Stocking of Ewes at Weaning, 338.
Molybdenum Deficiency and Stock Health, 435.
Molybdenum Deficiency of Marginal Areas of South Island, 219.
Moody, R. W.—Boron for Swedes and Lucerne, 339.
Morrison, L. G., and Congdon, N. B.—Mealy Bug in Hawke's Bay, 481.
Moss, G. R.—
  Feeding Concentrates to Milking Cows, 153.
  Swede Varieties for North Island, 223.
Mossy Growths on Roofs and Lawns, Phenols Control, 569.
Moth, Codling, Control of, 477.
Mucosal Disease, 265.
Mucosal Disease Control Procedure, 32.
Mucosal Outbreak Restrictions, Effects of, 231.

N
Nectarine, Yellow Leaf Spot and Fruit Pimpling and Cracking of, 423.
Nelson, Experimental Work on *Didymella* Stem Rot of Tomatoes at, 583.
Newcastle Apricots, Zinc Deficiency of, 585.
Nodding Thistle, Control of, 206.
North Island, Manuka Blight Losing Effectiveness in, 119.
North Island, Swede Varieties for, 223.
North Island, Wheat Varieties for, 27.
North Otago Downlands, Farm Improvement on, 10.

O
Onion White Rot, Control of, by Seed Pelleting, 531.
Orchard, Citrus, Nutrition, and Soil Management, 73.
Orchard, Home, in Spring, 161.
Orchard, Home, in Summer, 477.
Orchards, Hawke's Bay, Mealy Bug in, 481.
Orchards, Subtropical Fruit, Survey of, 570.
Ornamental Trees, Pruning and Care of, 89.
Otago, North, Downlands, Farm Improvement on, 10.
Owtram, I. H.—Management of Pigs in July and August, 33.

P

Paddocks, Closing, for Silage, 264.
Painting of Timber, 165.
Paspalum Silage, 427.
Pasture and Crop Production, 27, 327, 427, 521.
Pasture, Control of Crickets in, 458.
Pasture for Winter Green Feed, Sod Seeding Cereals into, 480.
Pasture Oversowing on Tussock Country, 27.
Pastures, Dairy, Control of Twin Cress in, 327.
Pastures, Harrowing of, 27.
Pastures, Irrigated, at Winchmore, Responses to Phosphate and Sulphur on, 269.
Peaches and Apricots, Hormone Application to, 353.
Peach, Yellow Leaf Spot and Fruit Pimpling and Cracking of, 423.
Peas, Harvesting, 521.
Peats, N.Z., Suitable in Composts and Rooting Media, 287.
Pedigree Pig Improvement Scheme, Qualified Litters in, 368.
Pests, Insect, of Seedling Brassica Crops, 102.
Phenols Control Mossy Growths on Roofs and Lawns, 569.
Phenothiazine Wool Stain, 113.
Phillips, D. S. M., and Scott, J. D. J.—Management of High- and Low-producing Herds, 198.
Phillips, L. V., Reappointed Chairman of Milk Board, 359.
Phosphate and Sulphur, Responses to, on Irrigated Pastures at Winchmore, 269.
Phosphorus Deficiency of Marginal Areas of South Island, 219.
Piano, Care of, 504.
Pig Carcass Competitions, 1959, 513.
Pig, Pedigree, Improvement Scheme, Qualified Litters in, 368, 518.
Pigs, Crops for, 125.
Pigs, Early Weaning of, 453.
Pigs, Landrace, for Breeding at Ruakura, 338.
Pigs, Management of, in July and August, 33.
Piper, B. M., Fletcher, W. A., and Baumgart, M. G.—Storage of Chinese Gooseberries, 15.
Plains Soils of Canterbury, Fertiliser Responses on, 317.
Plastic Containers for Plants, 37.
Poison, 1080, 457.
Poisonous Plants in Flower Garden, 594.
Polyanthus, Growing of, 278.
Potash, Lime, and Superphosphate on Irrigated Lucerne, 345.
Potassium Fertiliser, Effect of, on Sodium, Magnesium, and Calcium in Plant Tissues, 442.
Potassium, Soil Advisory Test for, 47.
Potato Tuber Moth, Control of, 339.
Poultry Mashes, High-energy, 135.
Powdery Mildew of the Apple, 53.
Power Lines, Use of Elevated Equipment Near, 140.
Pricker, Mechanical, for Extracting Heavy-bodied Honey, 329.
Primula, Growing of, 278.
Pullets, Laying, Dehydrated Lucerne Meal as Source of Vitamin A for, 341.
Puppet, Duck Glove, 288.

R

Ragwort on Dairy Farms, Hormone Weedicides for Control of, 21.
Rangitikei, Tainui and Gabo Wheat Trials in, 519.
Rankin, A. R.—Leatherjacket Damage to Cocksfoot Stands, 571.
Rape Seed, Harvesting, 521.
Redgauntlet Strawberry Plants, Runner Development of, Stimulated by Cool Storage, 104.
Redroot in Chou Moellier Controlled with MCA, 573.
Research Work by Farm Advisory Division:
  Effect of Potassium Fertiliser on Sodium, Magnesium, and Calcium in Plant Tissues, 442.
  Lime, Superphosphate, and Potash on Irrigated Lucerne, 345.
  Responses to Phosphate and Sulphur on Irrigated Pastures at Winchmore, 269.
  Soil Advisory Test for Potassium, 47.
  Tainui and Gabo Wheat Trials in Rangitikei, 519.
  Thiram as Seed and Ripening Grain Protectant, 103.
Research Work by Horticulture Division:
  N.Z. Peats Suitable in Composts and Rooting Media, 287.
  Yellow Leaf Spot and Fruit Pimpling and Cracking of Nectarine and Peach, 423.
  Zinc Deficiency of Newcastle Apricots, 585.
Reynolds, D. G.—Farm Improvement on North Otago Downlands, 10.
Roberts, D.—Mechanical Pricker for Extracting Heavy-bodied Honey, 329.
Roberts, Janet W.—
  Care of Piano, 504.
  Hors d'oeuvres and Appetisers, 394.
  Make a Bedside Lamp, 82.
Rooting Media, N.Z. Peats Suitable in, 287.
Rope, C. G.—
  Cappings Press for Heavy-bodied Honeys, 465.
  Steam Plant for Rendering Old Bee Combs, 43.
Roses, Summer Care of, 488.
Ruakura Farmers' Conference Week, 98.
Ruakura, Landrace Pigs for Breeding at, 338.
Runner Development of Redgauntlet Strawberry Plants Stimulated by Cool Storage, 104.
Rushes, Control of, 427.
Ryegrass Seed, Harvesting, 510.

S

Salinger, J. P.—
  Plastic Containers for Plants, 37.
  Polyanthus and Primula, 278.
  Summer Care of Roses, 488.
Salisbury, R. M.—Mucosal Disease, 265.
Sawdust, Covering Silage Clamps with, 437.
Say, J. S.—
  Begonias, 383.
  Ornamental Trees, 89.
Scott, D. F.—Surface Drainage and Graded Drainage Banks, 576.
Scott, J. D. J., and Phillips, D. S. M.—Management of High- and Low-producing Herds, 198.
Scott, R. H.—Farm Accounts, 57.
Seal, D. W. A.—Repairing Honey Combs, 467.
Seasonal Notes by Farm Advisory Division, 27, 125, 223, 327, 427, 521.
Section Comb Honey, Domestic, Production of, 449.
Seed and Crop Production, 223.
Seed Protectant, Thiram as, 103.
Selenium and Animal Health, 259.
Selenium Deficiency and Stock Health, 435.
Sheep Dusting and Spraying, Safety Precautions for, 469.
Sheep, Tip Spraying of, 431.
Shillito, N. L.—Barley Production, 63.
Silage Clamps, Covering, with Sawdust, 437.
Silage, Closing Paddocks for, 264.
Silage, Forage Harvester System of Making, 409.
Silage, Paspalum, 427.
Sinclair, R. M.—Preservation of Timber by Painting, 165.
Slade, D. A.—N.Z. Peats Suitable in Composts and Rooting Media, 287.
Smith, B. A. J.—Preparation of Land for Fodder Crops, 125.
Smith, E. G.—
  Better Feeding of Ewe Flocks on Mixed Farms in Canterbury, 298.
  Lucerne Sowing, 327.
Smith, H. C., Allen, J. D., and Hurndell, L. C.—Control of Onion White Rot by Seed Pelleting, 531.
Smith, H. C., and Hurndell, L. C.—Control of *Didymella* Stem Rot of Tomatoes, 577.
Smith, W. B. H.—Saving Mature Feed for Hoggets, 447.
Sodium in Plant Tissues, Effect of Potassium Fertiliser on, 442.
Sod Seeding Cereals into Pasture for Winter Green Feed, 480.
Soil Advisory Test for Potassium, 47.
Soil Deficiencies of Marginal Areas of South Island, 207.
Soil Management of Citrus Orchards, 73.
Soils, Plains, of Canterbury, Fertiliser Responses on, 317.
South Canterbury, Autumn-saved Grass in, 519.
South Canterbury, Unthriftiness of Lambs in, 335.
South Island, Fertility Problems of Marginal Areas of, 207.
Spanish Heath, 417.
Spinach, Food Value of, 502.
Spraying and Dusting of Sheep, Safety Precautions for, 469.
Spraying, Tip, of Sheep, 431.
Spring, Arrangement of Tile Drainpipes to Divert, into Drainage System, 138.
Spurrey Control in Brassica Crops, 115.
Stem Rot, *Didymella*, of Tomatoes, Control of, 577.
Stephen, R. C.—Spurrey Control in Brassica Crops, 115.
Stews, Drip, 182.
Stock Health Investigations and Trace Mineral Deficiencies, 433.
Stocking Systems, Different, Lamb and Beef Production from, 243.
Strain, Maud B.—
  Bacon Recipes, 291.
  Roasting Meat, 179.
  Washing Leather Gloves, 400.
Strawberry Plants, Redgauntlet, Runner Development of, Stimulated by Cool Storage, 104.
Subtropical Fruit Orchards, Survey of, 570.
Sulphur and Phosphate, Responses to, on Irrigated Pastures at Winchmore, 269.
Sulphur Deficiency of Marginal Areas of South Island, 208.
Superphosphate, Potash, and Lime on Irrigated Lucerne, 345.
Supplementary Feeds, Summer, 223.
Surface Drainage and Graded Drainage Banks, 576.
Swede and Turnip Varieties, 332.
Swedes and Lucerne, Boron for, 339.
Swede Varieties for North Island, 223.
Swedish Landrace Pigs at Ruakura, 338.
Symons, J. L.—
  Feeding out of Chou Moellier to Dairy Cows, 534.
  Harvesting Chou Moellier and Rape Seed, 521.

T

Taieri, Veterinary Diagnostic Station to be Established at, 359.
Tainui and Gabo Wheat Trials in Rangitikei, 519.
Tanker Collection of Milk, Cleaning Farm Vats Used for, 29.
Taylor, C. R.—Hormone Weedicides for Control of Ragwort on Dairy Farms, 21.
Tebb, C. P.—Mixed Age versus Cast-for-age Ewes in Fat Lamb Production, 378.
"Ten-eighty" Poison, 457.
Thiele, G. F.—Dwarf Apple Trees, 127.
Thiram as Seed and Ripening Grain Protectant, 103.
Thistle, Californian, 313.
Thistle, Nodding, Control of, 206.
Tile Drainpipes, Arrangement of, to Divert Spring into Drainage System, 138.
Timber, Painting of, 165.
Tip Spraying of Sheep, 431.
Tomatoes, Control of *Didymella* Stem Rot of, 577.
Tomatoes, Growing, in Home Glasshouses, 177.
Trace Mineral Deficiencies and Stock Health Investigations, 433.
Traycloth and Bib Set, 290.
Trees, Ornamental, Pruning and Care of, 89.
Trickle Irrigation, Automatic Control of, 30.
Turnip and Swede Varieties, 332.
Turnips for Summer Feed, 125.
Tussock Country, Pasture Oversowing on, 27.
Tussock Land, Depleted, Resowing, in Hakataramea Valley, 17.
Twin Cress in Dairy Pastures, Control of, 327.

U

U.K. Minister of Agriculture in N.Z., 471.
Unthriftiness of Lambs in South Canterbury, 335.

V

Vats, Farm, Used for Tanker Collection of Milk, Cleaning, 29.
Vegetable Garden Notes, 49, 173, 271, 347, 473, 543.
Veterinary Diagnostic Station to be Established at Taieri, 359.
Vitamin A, Dehydrated Lucerne Meal as Source of, for Laying Pullets, 341.

W

Waikato, Cereal Growing in, 225.
Walker, D. E. K.—Lamb and Beef Production from Different Stocking Systems, 243.
Wallace, J. O.—Swede and Turnip Varieties, 332.
Wallace, T.—Keeping Dairy Herd Healthy, 105.
Watkins, Joy—Transporting Flowers, 296.
Watt, J. H., Appointed Horticultural Extension Officer at Christchurch, 332.
Watts, I. M., and Brown, I. M. L.—*Didymella* Stem Rot in Nelson, 583.
Weaning, Early, of Pigs, 453.
Weaning, Mob Stocking of Ewes at, 338.
Weed Control Conference, 373.
Weed Control in Cereals, 138.
Weedicides, Hormone, for Control of Ragwort on Dairy Farms, 21.
Weed Identification and Control: Californian Thistle, 313.
Whatman, C. P.—Blue Lupins, 147.
Wheat Trials in Rangitikei, Tainui and Gabo, 519.
Wheat Varieties for North Island, 27.
White, J. V.—
  Consumption of Dairy Products in N.Z., 525.
  Trends in Livestock Numbers by Land Districts in N.Z., 575.
White Muscle Disease and Ill Thrift, 559.
Whitten, L. K.—Tip Spraying of Sheep, 431.
Wilson, D. W., and Kemp, W. S.—Hormone Application to Apricots and Peaches, 353.
Winchmore, Irrigation Research at, 553.
Winchmore, Responses to Phosphate and Sulphur on Irrigated Pastures at, 269.
Woodhead, C. E.—Powdery Mildew of the Apple, 53.
Wool Stain, Phenothiazine, 113.

Y

Yellow Leaf Spot of Nectarine and Peach, 423.

Z

Zinc Deficiency of Newcastle Apricots, 585.

Printed by Blundell Bros. Ltd. (The Evening Post), Wellington—10712

In the fruit game–

it pays off to keep cool . . .

Want to get your teeth into real profits? Keep fruit, every pound of it, in a Westinghouse Recold Cool Store. It will save waste and allow you to store your crop until the market rises and the worrying glut is over.

If you have a small orchard, you need only a small cool store, perhaps an existing shed converted at low cost. Ask a Westinghouse Engineer to quote you, for your particular needs.

And though it pays off handsomely to keep cool, you'll be surprised at how little it costs.

WESTINGHOUSE RECOLD COOL STORE

H.W. CLARKE (N.Z.) LTD.

H. W. Clark (N.Z.) Ltd., 42-46 Cable Street, Wellington; Eastbourne Street, Hastings; 10 Teed Street, Newmarket, Auckland; 256 Cashel Street, Christchurch; 1 Cliff Street, Timaru; 84 Tainui Street, Greymouth; 280 Hardy Street, Nelson; Cnr. Great King and St. Andrew Streets, Dunedin; 159 Spey Street, Invercargill.

Something at stake

WE sometimes forget that we live in a richly endowed country . . . a complete little world, created in the space of a century. Summer months in New Zealand are an ideal time to see the land in full bloom and the sight of busy farmlands reminds us that our prosperity is inherently tied with the soil. In order to expand our own economy as well as sell our produce to new and competitive markets, farm mechanisation will have a doubly vital role to play. International Harvester look forward to this challenge with confidence.

To all
"Journal of Agriculture"
readers
International Harvester
and their dealers extend
Season's Greetings

INTERNATIONAL HARVESTER

INTERNATIONAL HARVESTER COMPANY OF N.Z. LIMITED